Forestry

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No. 8
VOL. XXVI

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D. M. Campbell, Editor A. T. Kinsley, Associate Editor

Abscesses due to *B. necrophorous* in the liver and spleen of cattle, particularly cows, are not at all uncommon. The mode of infection in these cases has not been determined. The symptoms manifested in the liver abscess cases consist of unthriftiness and digestive disorders. In extensive abscess formation there is apparently a marked toxemia.

That bovine mastitis is of considerable economic importance is conceded by practitioners, especially those that are in practice in dairy sections. It is apparent that the quarters of the mammary gland may not be equally susceptible to infection. It is also evident that at least some types of microbes are continuously present in mammary tissue. Such microbes became pathogenic when the resistance of the organ is diminished.

According to the United States Census Bureau, 3,942,244 head of meat animals were slaughtered in 1929 by retail butchers in towns of less than 10,000 population. Of this number, 804,750 were calves, 1,139,785 other cattle, 202,305 sheep and lambs, 1,755,759 hogs and 28,758 unclassified. These figures do not include animals slaughtered in public abattoirs, animals slaughtered for wholesale butchers, nor animals slaughtered on farms. It would be interesting to know what percentage of these animals were inspected at the time of slaughter by a competent veterinarian.

Agglutination tests for *Br. abortus* infection were made on approximately 4,000 samples of pig's blood collected in abattoirs from various parts of New York State by Boak and Carpenter. A large percentage of these pigs had been shipped from the middle west. A very low incidence of infection was found.

On January 1, 1930, there were 1,143 dairy herd improvement associations (test associations) in the United States. In these associations there were 507,549 cows on test, the production of which was 60% greater than the average production for all milk cows in the United States. There is no question but that milk can be produced at a lower cost, by using the best known methods, than it can by ordinary methods. This would mean that fewer cows would be required for producing the nation's milk supply.

Welch, in a survey of the occurrence of bloat in sheep and cattle in Montana, found that a thick, luxuriant stand of sweet clover is more likely to cause bloat than a scattered, more stemmy growth; that cattle growers may expect a loss of 1% on sweet clover pasture, and that sheep men may expect to lose about 0.5%. No particular system of managing the stock on the pasture seems to have any influence on the occurrence of bloat.

It is an accepted fact by all authorities that the food supply bears an important relation to the physiological activities of the genitalia.—J. Quinlan.

An unusual case of mycotic pustular dermatitis in a dog was investigated by Leinati. The lesions consisted of small cutaneous abscesses in the region of the joints, muzzle and lips. From the lesions there was isolated a mucor and a fusarium, both of which were pathogenic for guinea pigs and white rats.—*Bio. Abst.* 8426.

ERADICATION OF TUBERCULOSIS IN POULTRY AND SWINE

On July 1, 1931, the veterinary profession entered a new field of activity. On that date the Federal Bureau of Animal Industry and the various states undertook the eradication of avian tuberculosis as a major problem. This campaign is planned to eradicate avian tuberculosis in swine as well as in the poultry flocks of the country.

Considerable avian tuberculosis eradication work has been done by the veterinarians engaged in the testing of cattle for tuberculosis, and splendid results from this work have been reported from several states, especially from Iowa and Michigan. This work is to be continued by the cooperating veterinarians. The new project is to be carried out largely in modified accredited areas.

Dean Stange of the Iowa State College, Ames, Iowa, has prepared a two-weeks' course of study for the bureau and state veterinarians who will be assigned to the eradication of avian tuberculosis in poultry and swine. This course is to begin on July 27 and end on August 7, and will be of great value to those who are fortunate enough to have an opportunity to attend.

Outlines for study on poultry diseases and various poultry problems have been forwarded to the men who are to be assigned to this new project, with a view of giving them a start before they reach Ames, so that no time will be lost in getting down to study.

Elmer Lash.

Washington. D. C.

It is exceptional for the *Br. abortus* to be eliminated from the udder of cows in which the milk shows agglutius under 1:80 or from cows in which the blood titer is lower than 1:320.—*Cornell Veterinarian.*

Soy bean meal from which practically the entire fat content has been removed is injurious when fed to cattle. If extraction is discontinued when 2 per cent of fat remains, the meal can be fed without danger of poisoning.—*Bio. Abst.* 8419.

An efficient average dairy herd of 100 cows requires an annual replacement of 26 head because of diminished production or loss by death from udder disorders, abortion, and sterility, according to Roberts. In other words, a dairy cow is economically productive for a period of four years.—*Bio. Abst.* 15784.

Concentration of the blood (anhydremia) due to excessive outflow of the blood plasma is, according to Underhill and his coworkers at the Yale University School of Medicine, one of the important factors in the fatal termination of superficial burns. The need of prompt replacement of the fluid part of blood is evident. Although it is not stated, it would seem that the intravenous injection of physiologic salt solution would be of value in patients suffering from superficial burns. —*Jour. A. M. A.* 96-3.

Vivian says that 1/1000 part of antimony will convert the best selected copper into the worst conceivable; Lord Kelvin says that the presence of 1/1000 part of bismuth in copper would reduce its electrical conductivity so as to be fatal to the success of the submarine cable; and W. R. Roberts Austin says that 1/500 part of bismuth in gold would render gold useless, for coining, because the metal would crumble under pressure in the die. If then it is seen that 1/1000 or 1/500 part change in a substance will make it unfit for the use it is intended, so a small change in a pharmaceutical preparation may give an untoward effect in the result.—*Pharmacal Advance.*

FLYTOX

Many insecticides are on the market and have varying efficiency and even greater variation in price. The range of prices at wholesale and in one gallon lots range from $1.65 to $4.

All of these sprays without exception seem to consist of a solution of the active principles of Pyrethrum flowers in kerosene at the rate of one-half pound powder to a gallon of the oil. In addition some essential oil is added to cover up the odor of the kerosene. The crude materials cost about as follows: Pyrethrum per pound, f. o. b. St. Louis (in hundred pound lots), cost about 39 cents per pound. Coal oil is obtainable anywhere at between 10 and 15 cents a gallon. If one desires a spray no more potent than the commercial article it is possible to obtain it by soaking one-half pound of insect powder for three days in a gallon of kerosene and decanting the clear liquid. This makes a gallon at an approximate cost of 35 cents.

However, it was felt that a much improved article could be made at a cost still far below commercial products. Accordingly, 100 pounds of insect powder were soaked for three days in 100 gallons of kerosene and the liquid siphoned off. Filtration or straining is almost impossible and results in much waste. Oil of pennyroyal, French, which is a most active insecticide besides possessing a pleasant odor, is added in the proportion of one pound to twenty gallons, which works out at the rate of 25 c.c. to the gallon. In five-pound lots this essential oil is worth $2 per pound, f. o. b. St. Louis. The finished product is applied with the tin "gun" sold with commercial brands of insecticide.

The expense of the hundred gallons which we made up, counting freight and 10 per cent profit to the druggist from whom the insect powder was purchased, makes the finished product cost just 75 cents per gallon. It should be noted that the pyrethrum strength is double that of the commercial and that the presence of the oil of pennyroyal makes it even more deadly. This is less than half the cost of the cheapest proprietary preparation. —*Bulletin No. 7*, Office of the Surgeon, 8th Corps Area, U. S. Army.

Progress in agricultural technic, improved methods and improved plants, has been great, but no more than sufficient to balance soil depletion through erosion and unscientific farm practices. Production per acre has not increased. The present agricultural surplus is due not to a greater crop production, but to more efficient utilization of the crop. A change from the less productive class of farm animals, horses and beef cattle to the more productive dairy cattle and hogs has reduced the consumption of grain per unit of food produced with the consequent surplus swamping the grain markets.—*Illinois Agriculturist.*

Parasites are present in most animals almost everywhere and at all times. Thus the veterinary parasitologist has a broad field when he treats only our common domestic animals and fowls, but his future field will be very much broader than this. Game conservationists, also state and federal agencies, are opening up lines of attack on problems of parasitic infestation among game birds and mammals. Among the problems of evident importance are those involving the control of such parasitic conditions as coccidiosis, scabies, tick infestations, lungworm disease, gapeworm disease, and helminth infestations of various sorts. Thus far no measures have been evolved to prevent the spread of parasites from one state to another by shipments of game and game birds which endanger domestic animals as well as other game animals. The interrelationships of disease and parasites of domestic and wild animals require investigation. Fur farming is constantly adding to the list of semi-domesticated animals which will be the veterinarians' patients in the future. Comparatively little is known of the parasites of fish. Thus the field of the future well-qualified veterinary parasitologist offers almost limitless possibilities.—John R. Mohler.

The Veterinary Student

By MAURICE C. HALL, Washington, D. C.,
President of the American Veterinary Medical Association

IT WAS observed by Froebel and others in the field of pedagogy that the hope of the future rests with our children and that the destiny of mankind is always in their hands. They differ from adults as a group in that they are still teachable and can still learn things. Adults, as a group, have passed this stage; they have learned what their elders have had to teach them, their impressions have hardened into established certainties, whether right or wrong, their cranial sutures have closed, and cerebral ossification has set in. Disillusionment has robbed them of many beliefs and few of them can face with a high heart and enthusiasm a life devoid of illusions. This is especially true of the present generation of mature men. We were raised in a world which still believed that wealth and fame were things to be greatly desired. We were skeptical of millionaires who told us that when a man owned a million dollars the million dollars owned him. We were puzzled by famous persons who fled applause and found no satisfaction in having their names in tall type. We had been taught that mankind was the center of all things, the outstanding thing in God's universe, and it was inconceivable that a man should find the outward and visible signs of his importance something less than satisfactory.

The present younger generation is probably fortunate in that it encountered at an early age a world out of which some of the hokum had been extracted by the heat and pressure of war. A world that boasted of its civilization, science, art, literature, music and culture had spontaneously and enthusiastically reduced life to the level of muddy shell holes and the bones of dead men. Against a background of physical courage and youthful enthusiasm there appeared only too clearly the figures of the profiteers. And when the smoke had cleared away a president of the United States announced that much of the official propaganda issued by the government was not true; that was the unkindest cut of all.

The present younger generation responded to these events by coining a score of new words for bunk of various sorts and looked with doubt and contempt on much that we at their age had swallowed unquestioningly. Nevertheless, youth is a time in the life of man when ideals flourish, and it is only a question as to what ideals. It is common practice to contrast the ideal with the practical, but youth senses that the ideal is the practical, and that the farther things are from the ideal the more impractical they are. The test of the practical is that it works. Nature's law of cause and effect is practical; it works. For the same reason it is ideal. Man's laws are not ideal and not practical; they do not work. To the so-called practical man a forked stick is a practical plow, but the closer our steel plows come to the ideal, the more practical they are. The ideal calls for effort in the form of thought and labor, and as we approximate the ideal it becomes practical. The so-called practical is the easy way, especially the way of least mental effort. The ideal is not the impractical, but it is the unattainable. It is the approximation of the unattainable ideal which supplies mankind with a goal which it can not reach but towards which it can, and always will, bend its efforts.

A vast amount of trash in human thought and motive burned up in the holocaust of war, but the valid and valuable things came out unscathed. It is still true that in peace or war physical courage is admirable; and that moral courage is still more admirable and a million times as scarce. It is still true that good sportsmanship, fairness, tolerance, courtesy and friendship are valu-

able, and the younger generation appreciates this fact. To the extent that they hold fast to these things and disregard their elders' eagerness for wealth, power and applause, we may hope for a future in which a truly civilized mankind can believe, what no intelligent person believes today, that "all's well with the world."

Our concern as veterinarians with the youth of today should include a concern with our veterinary students. These men should have close contacts with their faculties, not only at the school, but in the homes of their instructors. They should be gathered in small groups in round table discussions of professional topics under informal surroundings. Their individual characteristics should be noted, special talents encouraged, and weak spots strengthened. Whenever they can do so, these students should spend their vacations with practicing veterinarians or in laboratories, so that they may have as much clinical and laboratory experience as possible. There is a responsibility laid on our older generation to do our share to insure that our successors are better veterinarians than we are, to further the welfare of the profession, to add to its scientific and professional structure. To the extent that we do this we shall live in the future of the profession after our names have been struck from the rolls of the living. Our profession has all the attraction of things young and eager; it has the open road ahead of it and everything yet to be won. While we are doing our share today let us not forget the young man who is to carry on the good work. The veterinary student is the future veterinary profession.

Loss of Angora goats from tapeworm infestation was heavy during the early spring months, particularly in Arizona and New Mexico. One ranchman reported the observation of tapeworms 10 feet long in goats that were autopsied. Because of the prevalence of other parasites it is not possible to positively incriminate tapeworms as being responsible for the losses.—*Angora Journal.*

Tuberculosis eradication in cattle furnishes at least part-time employment to more than 9,000 veterinarians. These figures include veterinarians employed by the federal government, the states, and the counties. There is a possibility that B. A. I. will soon be directed to cooperate with the states in eradicating tuberculosis among poultry, in which event it will be necessary to employ more veterinarians.—John R. Mohler.

A field of promising opportunity for veterinarians is that of federal inspection with a view to controlling and eradicating communicable animal diseases and administering regulations governing the export and import of livestock. Experienced veterinarians in this field are the first to be called in event of an outbreak of foot-and-mouth disease, European fowl pest, or other contagious or infectious foreign disease. They are frequently placed in entire charge of eradication activities in a given area.—John R. Mohler.

The 20 experimental farms and stations operated by the Bureau of Animal Industry contain considerably more than 100,000 acres of land. The large numbers of animals raised experimentally each year on these farms enable the bureau's workers to obtain the new information which farmers, stockmen, and others need to safeguard the livestock industry and develop it to highest efficiency.

The reduction of bovine tuberculosis, which affected about 5% of the entire cattle population in the United States 12 years ago, to only about 1.7% is a result primarily of the excellent cooperation the Federal government has received from the states, which now are furnishing about two-thirds of the field forces and approximately the same proportion of the funds for operating expenses and indemnities. Certain critics who indulge in back-seat driving for government bureaus might wisely obtain more first-hand information concerning operations, economy of operation, and the extensive services the bureaus render to the public.—John R. Mohler.

Diseases of the Udder*

FOR 50 years a great deal of stress has been placed upon microscope and the laboratory in the investigation and diagnosis of disease. I will not undertake to say that there has been too much stress placed upon microscope and laboratory, but I maintain that other methods of investigation and diagnosis have certainly been neglected.

During the past five years, no other subject has been discussed so much by veterinarians as diseases of the udder. In our section of the country, at least 25% of the dairy cows suffer from mastitis to a greater or less degree and there are more herds in which this disease prevails than there are those that are free of it. I am sure that at least twice as much mastitis exists in our dairy herds as is recognized.

I think from our experience about Ithaca that I can say with confidence that I can tell you how to prevent mastitis. I am convinced that it can be prevented without much difficulty. I believe that the means of preventing mastitis is the most important piece of knowledge that the milk inspector can carry with him, and he should impart this information to the dairymen when he inspects the dairy. It will contribute more than anything else he can do to lowering the high bacterial count of milk.

From the symptomatic standpoint, mastitis is a chronic disease in the great majority of cases and it possesses in an even greater majority of cases, a tendency to recurrence. It flares up and recedes and flares up again and recedes and on and on to the very great loss of the dairy herd owner, if not the actual destruction of the herd so far as profitable production of milk is concerned.

I haven't much patience with classification of mastitis as interstitial and parenchymatous. Anatomically the udder is almost entirely a glandular organ and tubular system, and I can't very well see how there can be any extensive inflammation of the structure without involving glandular tissue.

Nearly all who start out to investigate the bacteria of mastitis end up with the streptococcus. Many cows that are regarded as being normal, produce only up to about 50% of their capacity and on the other hand, cows suffering from distinct cases of mastitis frequently give more milk than less apparent cases.

It is easy to see a connection between mastitis and nutritional disturbances.

Accurate diagnosis and intelligent measures are necessary in handling diseases of the udder. Mastitis, even those chronic cases that the dairyman seldom suspects, are susceptible of diagnosis clinically but it requires a great deal of practice and a lot of time spent on a milking stool to determine slight cases. Quite a percentage of the slight cases can be recognized by bacterial examination. This is true I should say in 25 to 50% of such cases, and this is important in practice since it tends to confirm or support the clinical findings.

I believe, however, that I can recognize infection of the udder just as well with the end of my finger as I can with an agar culture. We should be a tremendous handicap in handling this disease if we had to depend entirely upon the laboratory. Think of what a handicap it would be in tuberculosis eradication if 50% of the diagnosis had to be done in the laboratory. There seems to be a widespread impression that research must be done in the laboratory and not in the stable. There is too much of a tendency to keep away from the patient. It is because of this that we see laboratory reports of bacterial flora of the "normal" udder. Many of these so-called "normal udders" would be found to be distinctly and grossly diseased by better diagnosis.

It is not easy to tell whether a cow has mastitis when the udder is filled with milk. There is a time for everything and the time to examine an udder is when the milk has been fully withdrawn. A cow that has just freshened is likely to fool anybody who examines her udder. From our experience

*Notes from an address by D. H. Udall, Department of Medicine, Obstetrics and Ambulatory Clinic, New York State Veterinary College, Ithaca, New York, at the Sixth Veterinary Conference, Ohio State University, Columbus, March 18-20, 1931.

about Ithaca, it is perfectly evident that the dairymen need not continually suffer losses from mastitis. In our survey of a herd to ascertain its condition with regard to mastitis, we place the animals in four groups:

Group 1, those cows in which the udders are obviously healthy.

Group 2, those in which repeated examination is necessary—a bacterial and a chemical examination of milk in this group is distinctly helpful to the clinician in arriving at a decision.

Group 3, those that are revealed by physical examination to be distinctly affected and bacterial and clinical tests likewise agree. Nearly all of the animals in this group have a history of recurrent attacks of acute mastitis and it is from them in the main that group 4 is recruited.

Group 4 includes those animals so grossly and continuously affected as to be unmistakably recognized not only by the physical examination of the udder but by the physical appearances and chemical and bacterial examination of the milk.

When one goes into a herd to examine the animals for mastitis, a chemical (color test) and a physical examination should be made and if it is deemed advisable, samples should be taken at the same time for laboratory examination. The method used is to go down the milk line before the animals are milked. After rejecting the first few streams from each quarter, a stream from each quarter is milked into a strip cup. A few cc's of milk from each quarter is milked into a test tube. All four test tubes should all be held in one hand one should milk the quarters in the same order each time.

The strip cup should be examined for flakes, and some one of the alkalinity tests should be made immediately of the milk from each quarter, in the test tubes, and the information noted on the record for that cow. The normal pH value of milk is 6.2 to 7; that is to say it is just about neutral. Inflammation of the udder changes this pH value and changes the color and resulting solution in the alkalinity test. European veterinarians claim that they are able to detect this change by the taste of the milk and I think they do become very expert in detecting varying degrees of saltiness in milk. For my part, I would rather depend upon the color reaction, than to taste milk to find out whether or not it is pus.

The cows are then milked, after which a physical examination of the udder is made. It takes a good deal of experience and highly sensitive finger tips to detect small areas of inflammation high up in the interior of the udder, but it can be done. This information is added to that obtained by the strip cup examination and the alkalinity test, and as one develops skill in the manipulation, he will find a high percentage of agreement between these three methods.

However, the physical examination is the arbiter. That is, if an area is located in a quarter in some inaccessible part where from the physical examination we are in doubt as to whether or not it is pathological and the color test has shown that the milk is abnormal, it helps us to arrive at the conclusion that the lesion detected is pathological. If, on the other hand, we find the milk somewhat off in the alkalinity test, but we are able to detect no area of inflammation in the quarter, notwithstanding the most careful examination, we conclude that the variation in color is due to something other than infection. The strip cup test and the color test are very quickly and very easily made. They, in a large measure, confirm our findings by physical examination and they save time by pointing out the animals to which particular attention should be given.

A common way that the dairyman has of telling you that an animal is suffering from chronic mastitis is to say that this cow was all right in her first or second freshening. She was a fine producer but he burned her out and she hasn't been any good since. When you come to examine those "burned out" cows, you will find them suffering from mastitis.

In my opinion there is no relation between the Bang organism and mastitis, but it is not surprising that the Bang organism should have been blamed for mastitis. It has been blamed for about everything under heaven but perhaps the low price of milk.

The Dairy Industry in Michigan*

NO OTHER class of men are so important to the dairy industry as veterinarians. No other class of men are in a position to give the dairyman so much help or such wise guidance as our veterinarians. I bespeak for the dairy industry of this state a desire for the closest possible cooperation with the veterinary profession of the state.

For many years, the dairy industry gave no thought to the possibility of carrying disease to the consumer of his products. Up to 10 years ago, the dairyman considered that tuberculosis of his animals and abortion in his herd was his own business, but now conditions are changed. The dairyman realizes that if he wants a market for his products, he must meet the demands of consumers for a clean, wholesome product. He has no delusions that the industry can meet this requirement by itself.

The tremendous industrial development that began in Michigan about 15 years ago changed its agricultural industry over night. There quickly came a demand for liquid milk. Prior to that, the dairymen of the state were cheese and butter makers. They were not prepared to supply liquid milk for consumption. They did not have the equipment. They changed overnight from supplying cheap milk for condensers, cheese factories and creameries to supplying milk for consumption as liquid milk. And, as the number of industrial employes in the state was ever-increasing, there was almost no limit to the demand for liquid milk. But now the industrial depression that is all over the country has hit no state harder than it has hit Michigan. The increased price paid for liquid milk brought about the development of liquid milk supplyers in sections where it was in no way justified and now the industry is confronted with overexpansion. The increased income to agriculture on the whole in the five years preceding 1929 was only 1.5%. In the dairy industry the increased income amounted to 21.4%. The consumption of dairy products has increased 26% since the war. Whatever prohibition may have been to the country in general, it has been a tremendous asset to the dairy industry. Hundreds of cases of milk are distributed daily to the motor plants in this city to be used with lunches where formerly beer was distributed.

The relative greater return to the dairy industry per dollar invested than for agriculture in general, caused many farmers to go into the dairy business; but the dairy industry has been catching up with the demand. Two years ago, we were within two days' production of supplying the needs. Since then we have had a surplus. The surplus is not large, but the feeling is general that there is more than enough, and thus it is reflected in the price paid for dairy products. We can't continue to increase our dairy production. Wisconsin, Iowa and Minnesota are beginning to dump large quantities of butter into Michigan and this makes it harder for the Michigan farmers to sell their products. The Michigan farmer has been keeping old cows and culls, and he felt that he could not spare any cows because of Bang's disease, for the reason that he had a market for all the milk that he could produce.

In the next four or five years, Michigan farmers must control milk production. We have too many cows. Our herds have been continually increasing for five to ten years, and must not be increased further. On the other hand, they must be culled. We will have a flooded market if we don't do this. I ask you veterinarians to get this message across to your farmer clients. It is no time to expand herds. The farmer must study his cost. If he doesn't, he will have to get out of business. It is a cold-blooded elimination.

The price of butter fat will not average more than 35c in the next two years. At a price of 50c for butter fat, which has prevailed for a number of years, almost any old

*Notes from an address by Prof. E. L. Anthony, East Lansing, Head of Dairy Department, Michigan State College, at the Eighth Annual Post-Graduate Short Course for Veterinarians, Michigan State College, East Lansing, January 26-30, 1931.

cow is profitable, but at 35c, the story is different. Our farmers must readjust themselves to produce at a lower cost. The milk producer must figure it out something like this:

Let us say a farmer needs $1,000 in cash for taxes and other cash outlays. This is about the cash return over and above the cost of feed on the production of 19 cows giving an average of 4,500 pounds of milk per cow per year, or 87,000 pounds of milk. This is the average for cows the state over.

Let us, on the other hand, take the average production for cows in our cow test association. The average for these is 8,000 pounds and the cash return of eight cows, over and above the cost of feed, is $1,000. If the farmer keeps eight 8,000-pound cows instead of nineteen 4,500-pound cows, his cash return, over and above the cost of feed, will be the same; but instead of flooding the market with 87,000 pounds of milk, he will put only 64,000 pounds of milk on the market, and that will decrease the surplus and help the price.

Or, again, if he will keep six good cows, cows averaging 10,000 pounds of milk apiece, again his net return, above the cost of feed, will be $1,000; but he will place on the market only 60,000 pounds of milk, instead of 87,000; he will reduce the surplus 27,000 pounds, obtain the same amount of cash, and save himself a whole lot of work. Furthermore he will have accomplished all this without adding to the cost of his product to the consumer. That is a real achievement.

And, this is the lesson I want you veterinarians to put across to your dairymen clients. Dispose of the low-producing cow. There never before was a time when it is so necessary. Keep only the good cows. The cash return will be the same. The surplus will be cut down, or avoided altogether. A price of 35c per pound for butter fat, or more, can be obtained, and at this price the dairyman can make a profit on good cows.

Cows are cheap now, and they will be cheaper still for the next ten to fifteen months. Now is the time to clean up the herd, both of the diseased cows and the low producers. The dairyman can not always afford to do this when cows are high, but now, when they are cheap and going to be cheaper, he can get rid of these diseased animals and purchase seed stock of a higher quality at a lower price, even than inferior stock has cost heretofore.

Don't encourage him to raise heifers unless they are from specially selected, high-producing blood lines. There is a tendency when there is a surplus of milk, to feed it to calves and raise them. That is all right. Feed it to calves, but veal them. And, another thing, tell your dairyman not to try to get into the Detroit milk shed or the milk shed of other cities. For the past ten years farmers farther and farther removed from our cities have been anxious to get into the city milk shed, where they could supply liquid milk for the higher price obtained. The higher price does not always mean more profit.

Michigan dairymen are in a good position to act as a nursery for eastern dairymen. Michigan is the first state of consequence in the dairy industry to be free from tuberculosis. Michigan has the highest average production in the cow test association in the United States. It has a reputation for good cattle. If Michigan dairymen will free their herds from infectious abortion, as they have freed them from tuberculosis, we will have a good market for our surplus stock in the east. We are nearer this market than Wisconsin or Iowa. Michigan farmers are good feeders and our cattle have a good reputation.

It will mean not a little to Michigan farmers to be among the first to free their herds from contagious abortion and thus open a profitable eastern market for their surplus.

LOSSES FROM WARTS IN CATTLE PREVENTABLE

Common warts on cattle, though sometimes considered of minor importance, reduce the value of affected hides from slightly to as much as 25% and sometimes more. Moreover, the prevalence of warts on cattle is increasing according to information gathered by the U. S. Department of Agriculture.

Bang's Disease Control From a Practitioner's Viewpoint

By T. O. BOOTH, Temple, Texas

THE control of Bang's Disease is becoming the major activity of many cattle practitioners. The problem taxes the ingenuity as well as the knowledge and persistence of the veterinarian and his clients.

Certain fundamentals of the disease must be understood by both client and veterinarian:

1. Bang's Disease is a bacterial infection, one of the manifestations of which is the expulsion of the immature fetus.

2. Not all abortions are caused by Bang's Bacillus infection and not all cows giving birth to live calves are free from the disease.

3. A positive diagnosis can be made only by cultural, animal inoculation, and serological tests.

4. Bang's disease is a disease of sexually mature animals, i.e., those having reached the age of puberty.

5. The channels of entrance into the animal body are the digestive tract, mucous membranes, the skin, and by subcutaneous inoculation both intentional and accidental.

6. The channels of elimination from the infected animal are the vaginal discharges after aborting and calving, the milk, the genital secretions of the male and possibly the feces and urine. Aborted fetuses and membranes are additional sources of infection.

The basis of all control procedure should be the agglutination test results.

Certain reaction features, however, should be thoroughly appreciated:

1. Calves under the age of puberty, showing a positive reaction, will in most instances cease to react positively if removed from the infective environment for a period of sixty days.

2. Cows in the last 30 days to 60 days of gestation and for a period of 30 to 60 days after calving and aborting may show a negative reaction although infected. Cows sufficiently affected to cause abortion will show negative earlier in the gestation period or 30 to 60 days prior to the time of abortion.

3. First-calf heifers are very prone to show negative reaction although infected.

4. There are end reactions, partial agglutinations, at both the beginning and ending of the infection in individual animals, which necessitate further testing to determine whether the disease is retrogressive or aggressive.

5. There are positive reactions in both natural and artificial immunity.

6. Variable results will be had from different laboratories due to the different sensitivity of the antigens used, differences in technic, and different conditions of the serum when received by the laboratories.

7. The question of what dilution should be considered positive, what suspicious and what negative or without diagnostic value, has not been definitely settled, however complete agglutination in a dilution of one to fifty or higher may safely be considered positive as far as control of the disease is concerned.

The presence of the disease having been definitely proved in a herd, as evidenced by positive agglutination reactions among the individuals of the herd, the method of choice as to handling depends upon the desires of the owner and his ability financially and physically to carry out effectively the necessary procedure.

Primary testing of the entire herd of breeding age is more satisfactory to both the owner and his veterinarian in establishing a diagnosis since the relative percentage of infection will thus be shown, and it may be used as an intelligent basis upon which to inaugurate control or eradication measures.

In herds where the immediate disposal of all infected animals is not desired or contemplated and where segregation is not desired, or in the infected part of a herd where segregation is practiced, one of the following methods of control may be used:

Use of bacterins.—Large dose of abortion bacterin may be given at frequent intervals to all pregnant cows to control the abortions. Doses of 20 to 40cc given every 15 to 30 days are indicated and should be started as early in pregnancy as possible and continued throughout the gestation period. Anti-abortion serum may be of value if given in sufficiently large dosage at intervals of not less than ten to fourteen days.

Intravenous bacterins given in increasing dosage every seven to ten days for three injections may be given to all cows except those heavy with calf once yearly. Shock may occur when giving this treatment and should be controlled by the use of adrenaline solution.

Chemical solutions are of questionable value at this time and should not be relied upon altogether until further experimentation has proved them of value.

Avirulent vaccines.—A considerable degree of immunity may be established by the use of such vaccines in pregnant animals and in herds where the stopping of the abortions is paramount. Their use upon all pregnant cows will suffice as the cheapest way out. Their indiscriminate use in unknown and clean herds is deplorable. One very grave danger following their use in dairy herds is the fact that the disease will be established in the udders of some of the cows. Another danger is the possibility of the creation of carriers. The evidence of this factor, however, is not conclusive.

The principal difficulty confronting the use of such vaccines, from the practitioner's viewpoint, is the inability to obtain constant uniform results from their use, due possibly to the fact that such vaccines have not been standardized as to virulency.

The use of avirulent vaccines to produce immunity in open cows is practical provided the vaccine has the proper virulency.

Taking into consideration the present knowledge of the disease and the present status of the biological products now on the market for immunizing the logical procedure is to use the avirulent vaccine on infected herds of other than those producing milk for consumption in the raw state and bacterins in those herds producing raw milk.

It is possible in infected herds to control the disease to a greater or lesser extent by a strict sanitary program, including segregation of all cows at calving time and any that should abort in the herd, until the discharges have cleaned up.

Methods of Handling to Obtain a Clean Herd

1. In herds showing a small percentage of positive reactors the infected animals should be removed from the herd by slaughter or sale and a retest made every three months for a period of one year, and any subsequent positive reactors immediately removed from the herd. In badly infected herds the remaining negative reactors should be retested more frequently for the first six months or until the disease has seemingly been eliminated. The herd should be handled as a clean herd.

2. The infected animals may be kept segregated from the clean herd on the same premises. The clean herd to be retested and handled as above outlined. The infected herd to be handled as in herds where the disposal of infected animals is not done. The segregation should be as thorough as possible, preventing drainage from the infected premises running onto the clean premises, preventing mechanical carriers from carrying the infection from the infected herd into the clean herd and not allowing the infected animals to come in contact with the clean animals or their food or water. Under no circumstance should an infected cow, that has recently calved or aborted, be allowed on neutral premises used by the clean herd.

Calves from infected herds should be weaned as soon as possible and removed from the infected environment and fed milk known not to be infected. They should be tested before being bred and placed in the clean herd. Use separate bulls for clean and

infected herds. As the infected cows become nonbreeders, poor producers or otherwise become unprofitable they should be disposed of for slaughter.

3. Calves from an infected herd may be used as the basis of building a clean herd, provided they are protected and handled as a clean herd.

4. It has been found that some infected cows will lose the infection if not bred for a variable period of time. Such open cows should be segregated from both clean and infected cows and tested at six months intervals. There is a possibility that such cows could be placed with the clean herd without spreading the infection, however, the possibility of the Bang organism being present in the urine and feces has not been investigated as in the infected human where it is frequently found in such discharges. The method is expensive as the cows are nonproducers for a period up to possibly two years.

Handling clean herds: Naturally after having gone to the expense and effort of establishing a clean herd all precautions possible should be taken to insure its remaining in that status.

Maternity stalls should be provided whenever possible and all cows due to calve should be placed in these stalls a few days before the calving date and kept there until all discharges from calving have ceased before being again placed with the herd. Any cow aborting from any cause, or any cow showing symptoms of abortion should be placed in a maternity stall until it has ceased discharging. Such stalls should be thoroughly cleaned and disinfected before being used again and should be so segregated that other cattle cannot enter them. Needless to say that all aborted fetuses and membranes in the stalls or pasture should be disposed of by burning or burying with quick lime.

No other cattle should be allowed to associate with the clean herd or use any pastures used by them. Adequate fencing should be provided to insure against accidents of this nature. Infected cows may use a milk barn used by the clean herd provided the clean herd is milked first, the barn has a cement floor and is thoroughly cleaned after each milking, that no infected cow having a discharge is allowed in the barn or neutral ground used in yarding or entering the barn and double fencing is used for yards to prevent actual contact of the two herds.

Additions to clean herds.—Possibly the gravest danger to clean herds is the addition of other cattle. When buying most dairymen, especially, are in the habit of buying heavy springers. These are the most dangerous cows to add. The results of the agglutination test cannot be relied upon in such cows. The ideal animals to add are open heifers and cows which have calved about sixty days previous and which have not been rebred. If others than these classes are added they should not be placed with the herd but segregated and tested at the proper time when they are open. If this is not done sooner or later the infection will be re-introduced by a infected negative reactor.

Do not use bacterins, vaccines, or serums in a clean herd. To do so makes uncertain the results of testing and confusion as to whether or not the herd is clean. Veterinarians and herdsmen are potential spreaders of the disease. Wherever possible herdsmen should not be allowed to handle cases of dystocia or retained placenta and the veterinarian should habitually use sterile rubber sleeves, gloves and clothing, and use only sterile instruments both as a protection to himself and the animal.

There are many details of management of herd and help that must be fully established in practice of sanitary police. They must be carefully thought out and planned for each herd and condition to insure adequate protection from the disease.

Taking Blood Samples

The taking of blood samples for the agglutination testing constitutes the major surgical operation in most herds. The technic of an individual veterinarian should be that which enables him to perform the operation most efficiently. Certain precautions are necessary, i.e., cleaning and sterilizing needles between each operation to prevent contamination of one blood sample

with that of another and to insure against transmission of infectious diseases from one animal to another. This may be accomplished by first washing in cold water, then in a formalin solution, allowing the needle to remain in the formalin solution for at least twenty minutes, and again in clean cold water before use. Use a hypodermic syringe or bulb for forcing the water and solution through the needles. After the needle has entered the vein the blood should be allowed to flow through for a few seconds to clean the lumen of the needle before catching it in the tube. A small amount of water or antiseptic solution in the needle or tube will cause hemolysis of the blood. In collecting blood samples from a herd it is desirable to have enough sterile needles to use a different one for each cow.

Most owners of large herds are desirous of getting the bleeding over as quickly as possible. It is not necessary to shave the site of puncture and such procedure leaves an unsightly spot on the neck of the animal. Antiseptic solution is not necessary and if used should not be allowed to enter the blood tube. It is costly to the owner to have his men waiting on the veterinarian while he does a lot of unnecessary technic. Have plenty of sharp needles and a corborundum stone to sharpen them with, towels with which to wipe the blood from the tubes and the hands and a helper to place the labels upon the tubes. Be certain that each tube is labeled with the identification of the animal from which the sample was taken and also that the identification of the animal is such that positive identification can be made several days afterwards, or longer in herds doing regular testing.

Have the animal effectively restrained with head turned from the operator, use the thumb and fingers as a tourniquet, use the upper third of the neck, locate the vein by palpation and sight, watch for the vein at the angle of the jaw while palpating. Puncture just above the thumb. Release the pressure before removing the needle to prevent blood dripping. Fill all tubes as evenly as possible so that they may balance in the centrifuge if such is necessary and do not place labels so as to cover the top of the blood in the tubes. Be sure tubes are dry and sterile. If samples are to be shipped long distances allow the serum and clot to separate and send the serum only. Pack all samples in ice unless the weather is cold.

Testing Samples

There is no choice, as to efficiency, between the plate and tube methods, however the tube method should be confined to properly equipped laboratories. In carrying out the plate method the serum, the plate and the antigen should all be at about the same temperature and at blood heat. The colder the test the slower the reaction. Do each batch of tests at the same temperature to insure uniform results. Different antigens vary in their agglutinating ability Check or compare the new with the old upon several serums to determine the relative sensitivity of the new antigen with that which you have been using when making a change.

Interpretations of the Test

It is preferable to start the testing of a herd when the disease is quiescent. In testing a herd which is aborting badly it is difficult to get many of the infected cows to react positively, due to recent abortions as well as the fact that there are other animals which will abort within a short time. Remember the limitations of the test and look with suspicion upon all first-calf heifers, cows that have recently aborted or are due to calve within the next sixty days. Whenever possible test each individual cow about sixty days after calving or aborting and before she is bred, in addition to the regular herd test. Most of the highly suspicious reactors will prove positive and the slightly suspicious reactors will very likely become negative.

Testing for Interstate Shipment

Due to the fact that only one test can be made and that most dairy and breeding cattle going interstate are heavy springers the test is very inaccurate in some instances. The addition of such cattle to a clean herd should be done in the same manner as the addition of other cattle not known to be from a clean herd, i.e., testing while open.

Herd owners should be warned that the addition of tested clean cows to an unknown or infected herd may cause the disease to become established in the clean added cattle and that abortions and other sequella will result from such addition. All herds should be tested and the presence or absence of the disease established for the owners' guidance when adding cattle to his herd.

Sanitation

Cleaning and disinfecting around barns, lots and sheds should be habitual. Feed troughs and mangers should not be contaminated by stepping in them with soiled boots or shoes. Earthen tanks or ponds, in which cattle may wade should be drained or fenced. Do not feed roughage in such a manner as will allow the cattle to tramp upon it. Running goats and cattle together is bad practice.

Public Health

The disease is transmissible to the human, however, much has yet to be learned as to its mode of transmission, sensitivity to types, etc. Evidently the disease is readily transmitted through the broken or unbroken skin and veterinarians and others handling retained placental and obstetrical cases in both cattle and hogs should use rubber gloves to prevent direct contact with the infected discharges. Milk has seemingly been incriminated, but the percentage of infection in those using milk from infected herds is very low or entirely absent as compared with the infection occurring in those using milk from herds known not to be infected. An agglutination titre of 1-200 or above has very consistently revealed the presence of the infection in the udder of the cow.

Cost of Bang's Disease

Bangs' Disease is very widespread in both registered and grade herds and in beef as well as the dairy breeds. Herd owners do not as a rule realize the enormous cost of maintaining the disease in their herds. These costs consist of loss of offspring, lessened and loss of milk production, sterility, loss of udders of both milk and beef breeds, increased mortality in the herd, increase of veterinary services, necessary use of biologics and decrease of price of animals in an infected herd as compared with a clean herd.

The problems surrounding the disease are rapidly being solved and it is hoped that in the not distant future this disease may be placed in the class of other diseases of animals as one having been conquered by the veterinary profession. The veterinary practitioner, of necessity, will have had a major part in this achievement.

CORNSTALK DISEASE IN HORSES*

Cornstalk disease in horses is known by many names, such as cerebritis, encephalitis, stomach staggers, blind staggers, cornstalk impaction, etc. These names probably include a group of ailments. The type to which I refer is an ailment seen only in dry years and usually in horses turned into the stock field, and in which paralysis of the large bowel is a constant feature.

I see a few cases of this from year to year, but it was only in the fall of 1913 and again in the fall of 1930 that I saw such cases in large numbers, seeing probably 300 cases in each season.

The disease is peculiarly distributed over a community. It may be seen in one field and in an adjoining field there may be no cases. I have seen four to nine cases on a single farm, and in one instance six affected animals at one time. More often than not, the history given is that the animals have been used to gather corn in a field in which owing to hot, dry weather, the stalks fired considerably at the bottom before the grain was matured.

The respiration will be 30 to 40, and the pulse up to 90. There will be marked flatus and the animals roll about. The trocar must be used freely at least four or five times in 30 to 60 hours. I give one-half grain of arecoline every half hour until the bowels move freely, and also give ginger, nux vomica. I find it well to give a gallon of neutral oil through the stomach tube when treatment is first commenced.

I have had a good percentage of recov-

*Notes from a report by W. F. Hackney, Marion, Illinois, at the Twelfth Annual Illinois Veterinary Conference, University of Illinois, Urbana, February 10-12, 1931.

eries where the cases were treated early. They were not as severe last fall as they were 17 years ago.

MILK INSPECTION*

The average span of human life has increased considerably since the beginning of the century. In 1900, the average expectancy was 49 years; in 1910, 51 years; in 1920, 55 years and in 1930, 58 years. Previous to that time, the increase in longevity was slow. Sanitary science has been largely responsible for increasing the average span of human life during the past 30 years, and sanitary science has to do in part, of course, with man's food.

Milk is our best food but it may be dangerous. It is readily contaminated and the prevention of contamination is an important matter in disease prevention. It is essential that milk be produced by healthy animals, and that it be handled by healthy persons, in proper utensils, under proper methods and that it be promptly cooled.

Milk-borne tuberculosis was formerly common. It is not now. Eradication of tuberculosis in cattle and supervision of the milk supply is responsible for the decrease in this disease from this source. Bang's disease in cattle is a definite public health problem. So also is epidemic sore throat.

The problem of delivering to the consumer a wholesome milk supply is a difficult one. Many things are involved, the method of milking, the type of milking machine, and pasteurizers which must be of the right type if they are to work efficiently. Milk bottles should be sterile or nearly so. Cooling is essential. Good milk improperly cooled soon becomes bad milk. Transportation from the dairy to the plant has its bearing. Milk should be blanketed. Cooling must be done on the farm. All of these things should be specifically provided for in the regulations.

Pasteurization must never be allowed to be an excuse for marketing any but good milk. Pasteurization is merely an additional safeguard for good milk. Bad pasteurization is worse than none.

Certified milk is the only milk that should be used raw. The time seems well in the future when any but pasteurized milk can be used in the general supply.

The milk inspector should be a veterinarian and he should be in sympathy with the regulations. The need for veterinary training in meat inspectors is quite well recognized. Relatively few cities recognize the need of veterinary training for milk inspectors. Unless veterinarians sell themselves for milk inspection soon, it will be too late. The field will be preempted by others.

*Notes from an address by W. P. S. Hall, Chief, Bureau of Foods & Drugs, Division of Health, Toledo, at the Sixth Veterinary Conference, Ohio State University, Columbus, March 18-20, 1931.

PSORIASIS OF COWS*

I have a client who, for the past four or five winters, has had a great deal of trouble with some sort of itch in his dairy cows. The trouble begins when he puts them in the barn about September 1st, and continues uninterrupted until early spring when he turns them out on grass.

It is a really serious inconvenience. The animals are difficult to milk and thrash themselves about in the stanchions, and attempt to rub the head and neck. The itching seems to be worse on the udder and about the head. Many of them have to be roped to be milked.

There are no lice present and I think no other parasites. Occasionally these cows show local lesions on the teats, small pimples, but it seems to have no bearing on the psoriasis, which is neither worse nor better when these pimples are present.

New cows coming on to the place very shortly contract the disease. The skin is clean and in good condition, and the feed good alfalfa hay, and ground oats, seems all right in every respect.

This barn itching is about to drive my client out of business. It has already spoiled his temper, soured his disposition and driven him out of his head on numerous occasions. I would appreciate any information that would relieve this condition. My client's sole chance of leading a pious life depends upon it.

*Notes from a report by F. E. Stiles, Battle Creek, Michigan, at the Eighth Annual Post-Graduate Short Course for Veterinarians, Michigan State College, East Lansing, January 26-30, 1931.

Sheep

By W. B. CRAIG, Indianapolis, Indiana

THE sheep industry is a very important issue with the veterinarian; he should have a working knowledge of the husbandry and the diseases. We are consulted, not only about the diseases of sheep, but about their general care, and should be able to give our clients the information sought, rather than force them to go to county agents who know so well how to talk and so little how to do.

Can the general practitioner make any money from sheep practice? Not a great deal directly, but we should do our part regardless and thereby further merit greater confidence of the live stock man. We can show the skeptic that the veterinary profession can take care of all his live stock disease problems efficiently and economically.

In the central west a small flock, say fifteen to twenty ewes, is most profitable for the average farmer, unless he is, or wants to become a breeder of pure breds, and even in the latter case he had better not get too many. It is not advisable to get more sheep than the housing and varied feeds of the farm will handle. Sheep will clean up roughage that cattle will leave, and consequently convert this into mutton, but it is too much to ask them to do this without the addition of grain and hay as conditions require.

When I am asked, "What kind of sheep would you raise?" Any breed you like. In starting a flock, if the client has scant knowledge, I advise grade ewes and a pure-bred ram for a year or two, until the flock owner gets familiar with the care and feeding, then he should select the breed he likes.

Flock Feeding—fall and winter. Roughage. A legume hay, red clover or alfalfa. One of these I consider essential, supplemented with corn fodder, oats straw, bean hay or bean straw, or even a very light sprinkle of timothy at times. Bean hay is very rich, consequently a trace occasionally and silage, particularly that made from well dented corn, makes good feed. Sheep may get the corn fodder by pasture in stalk field and they pick up other roughage when they can reach it.

Concentrates. Oats. As the clover or alfalfa is first in roughage, so the oats stand out in concentrates. A little bran. It should be varied according to the bowel action, as too much will cause diarrhea and be wasted. A very little corn if you are short of oats, but you have to look out for too much fat on your breeding flock, and maybe a trace of oil meal. One can't give a whole lot on feeding in a short article; just keep in mind, as great a variety as possible is desirable, and you are not feeding a steer for the fat stock show.

The flock must be watched very closely as lambing time approaches, since it may be advisable to lighten the ration in the last two or three weeks. Over-feeding is worse than under-feeding. The troughs and racks should be kept clean and under no circumstances should hay be allowed to accumulate in the racks. Give what they will clean up and no more till next feeding.

Allow free access to water. I am convinced that many farm animals suffer from lack of water in the winter as they either do not get enough, or it is too cold for them to drink. Salt should be before sheep all the time, and they should be hand salted instead of allowed to run to blocks, where they dig small holes which get filled with snow or rain water and produce diarrhea and sometimes death.

Minerals. No. Put the minerals in the ground where they belong and feed them in the plant where they are available. Our soils are being depleted of their necessary minerals in many regions, and these should be restored by appropriate legumes, manures and fertilizers.

Housing. Dry and free from draughts, particularly under-draughts, though I do not believe in keeping sheep in a closed barn or shed. Keep the door open or partly open

all the time, but they must be kept dry above and below. It does not pay to turn sheep out in the rain in cold weather, but when it is dry they can stand all kinds of cold; even very young lambs when dry are not hurt by cold. Keep the shed well bedded and the lot as dry as is possible. It is imperative that breeding ewes have plenty of exercise, and feeding a little hay a long way from the barn may help to this end.

The veterinarian is not often called to treat a single sheep, but more often for the flock; consequently we have flock diagnosis and flock treatment. This must be largely founded on final individual examination. In the primary examination of the flock some tact should be used, or you will fail to get a good start in your examination. Approach the flock in company of the flock master only. Sheep are timid and easily startled, so approach cautiously, and if they are lying down they will begin to arise slowly. That will give you a chance to note condition of the flock, the fleece, lameness, stiffness, diarrhea, itch or slowness. As you approach nearer, the flock will usually walk away and the slow sheep will bring up the rear, or if there is scab some will seek a place to rub, or scratch themselves with their hind feet. The slow are the ones likely to be affected and can then be identified, and caught when enclosed. A careful examination can then be made. In catching a sheep do not grab by the wool, but around the neck or the stifle and turn the animal gently any way you wish, but be gentle.

In giving medicine I use a two-ounce dose syringe with a medium length nozzle, about five or six inches long. Keep the sheep's head level and you will not have a bit of trouble about getting the medicine into it. Of course, you will arrange so the animal can not back just as you would a horse. Do not get the animal off its feet.

General Diseases, Infections and Parasites

The sheep is a ruminant, which we sometimes forget, and is subject to the same general diseases of the digestive tract as the cow.

Bloat.—Same causes as in cow and same treatment, except different dosage. Two drams of formaline in pint warm cow's milk given half at a time twenty minutes apart. Here, if you do not happen to have a syringe you may use a small mouth bottle, and if you desire to be ultra technical you may use your soft rubber horse catheter as a stomach tube. A hog speculum or small clevice for a speculum. Creoline salicylic acid, or any other anti-ferment may be used, but I almost invariably use formaline with milk as the vehicle. As they die very quickly, you had better suggest treatment to client when he phones and hurry out to correct the condition that is causing the bloat.

Impaction is caused by faulty feeding, lack of drinking water and exercise. Correct the feeding. Give five grains tartar emetic, one dram ginger and three or four ounces epsom salts in warm water and repeat, if necessary. Too much straw and not enough bran may induce impaction. Simple diarrhea or constipation are of dietetic origin and may be controlled by tannic acid or mineral oil, as the case indicates. Sheep do not like tannic acid; the goat does. A very little acts very favorably in simple diarrhea.

Urethral Calculus.—There is one disease of the genito-urinary system for which we have to be on the lookout, and that is urethal calculus. Blocking of the urethra with deposits of lime substances in rams and wethers. It occurs most frequently in wethers, owing perhaps to the small calibre of the urethra. Symptoms. Straining, attempts at urination, dribbling and edematous swelling along the sheath. The animal soon gets down and dies. It is caused by feeding beets, mangels, turnips, etc., and I have seen it in a flock of feeding wethers that were watered from a well, the water of which was very hard.

The calculus is usually near the end of the urethra and occasionally may be felt. These calculi differ in density and sometimes are soft enough to crush with the fingers, if not, you may cut down and remove, leaving the wound open. Of course, there may be others along the line, and a sheep does not stand a whole lot of surgery.

If the flock is nearly finished and the market not too unfavorable, market is the idea; but of course the feed should be corrected, and in the flock previously mentioned it happened to be convenient to supply it with rain water, which was done with good results.

Foot Rot.—The feet of the sheep should be looked after, particularly if they are on low, wet ground. Sheep seem to do better on rolling, than on flat ground. Their feet get long and sometimes develop rot and lameness. Place the animal on a low table and trim the feet with incisor cutters or small pruning shears, leveling up and cleaning out with a small drawing knife, such as you use for nail punctures and treat with equal parts of iodine and phenol, formaline, butter of antimony or copper nitrate, sometimes one works better than another, and I use them as they work for me. Make the lot as dry as possible and bed well.

Dentistry.—The teeth of sheep, particularly of aged rams and ewes that the owner wants to continue to use as breeders, may need care. The lower molars form a kind of a scissor mouth and the sheep can't grind properly. These may be trimmed with an offset bone cutter or tooth forcep and the sharp edges blunted with convex incisor file. There is no advantage in grinding feed for adult sheep, they should do their own grinding and will do better.

Not infrequently we are called to see a flock that has been mangled by dogs, and our advice asked about what would be just compensation. The law in Indiana allows payment for those killed, so we had better not be too hurried, and be very careful in our individual examinations, as some that appear only slightly injured may die. Those severely injured should be destroyed. These two facts are not so hard to decide upon, but there is a flock damage which varies greatly, but which is always present. Whenever dogs get into a flock of sheep, that flock does not do any good for months and may have to be sold or changed, so that should be kept in mind in the settlement. Just compensation should be allowed, or at least suggested, by the veterinarian to the appraisers.

In fractures, wounds and dislocations the rules of general surgery apply.

Obstretics

The rules of obstetrics apply in the sheep. Assistance is needed at times as in other animals. It is hard to pull a loose cork out of a bottle sideways, but comparatively easy to pull it endways. Sheep are easily handled because you can place them in any position desirable, and can have the hind quarters elevated, if the case calls for it in case of propulsion, like when twins are trying to come at the same time. Clip the wool from parts, employ surgical cleanliness and good lubrication. In prolapse of uterus the treatment is same as in the cow. Newborn lambs must be kept warm till dry, and if chilled should be put in warm water, about as warm as you can hold your hand in, then dried and left by the stove. It should usually be ready for its milk by the time it is dry and will be all right as soon as it nurses.

Pregnancy Disease

There is a disease of breeding ewes that is called pregnancy disease, acidosis, and I don't know what else. I have always considered this one of the deficiency diseases and have seen nothing so far to make me change my mind. This condition is manfested by the ewe going by herself, gait stilty, panting, nervousness, impaired vision, head drawn up like a horse with a tight overcheck and finally down, where she may lie and kick for a week, before she dies. No elevation of temperature. Constipation. While I have seen this disease in ewes carrying only one lamb, it is not the rule. When it occurs it is almost invariably in case of twins or triplets. That would indicate that the additional drain of the extra lambs was taking out more of some element than was consistent with health. The ewes always appear in good condition, often with more fat than is advisable. I advise plenty of exercise and curtailment of fattening feeds. Calcium gluconate, expensive but satisfactory in 50cc dose. I do not like any agent that will produce slough, so have not tried calcium chloride. Give calcium phosphate, a few grains in feed, and cod liver oil, half ounce daily. If green feeds can be ob-

tained, they are helpful, and you can often get outside leaves of cabbage or lettuce at the grocers without cost. A few blades are relished. This disease is becoming more common than formerly, in fact you have always to be on the lookout for it in this part of the county, and it causes heavy losses. Maybe it is due to the depletion of our soils, which has been going on at a great rate.

Parasitic Diseases

Parasites are the bane of the sheep industry. Dietetic ignorance and parasites keep sheep from becoming too cheap, but it is our business to prevent losses. Much wonderful work has been done in parasitology, so there is small excuse for the veterinarian not having a good working knowledge of this branch of the profession. We plain practitioners may not be able to *"Haemonchus contortus"* whenever we want to, and then it might be fatal to the owners, but we should know the common names, if there are any, and "by their works we should know them."

External parasites.—I can only deal in generalities in this, as you are all familiar with lice, ticks, scabies and maggots. However, maggots should be mentioned as they are always a menace and kill many sheep. Filthy wool, wounds or abrasions of any kind are favorite nesting places for the blow fly, and in examinations during the spring, summer and fall you must be on the lookout for maggots. I have seen a very small hole on the rump of a sheep leading to a wide area under the skin full of the pests. Sheep should be tagged from time to time and cuts made in shearing should be tarred. Chloroform used in a small oil can is the old standby, but I have had good luck with an ounce of liquid cresolis compound in a pint coal oil, also used in an oiler. The old black oil (oil tar, turpentine, iodine, linseed oil) is good to brush on wounds. When once maggots get started you have to use something that will stick and leave odor enough to repel the fly.

Dipping.—That should be a rule with the man who would be successful with sheep. Not less than two weeks after clipping and soon as possible thereafter dipping should be done (lambs as well), and again before cold weather sets in, if there are lice or ticks in any quantity. The sheep will then go into winter quarters in good condition and lots of feed will be saved.

Scabies is a matter for the state. You should immediately call the state authorities and let them confirm the diagnosis and issue the proper quarantine and do the appropriate dipping. I cannot emphasize this too strongly, as this is not a matter for the local practitioner.

Grub in the head.—One of the worst insect pests that harass the sheep man is the sheep bot fly. While it rarely causes death, it does cause much loss of condition, unthriftiness and makes the flock unsightly. Very wide spread. Infestation occurs during hot weather and then the fly is most active in the middle of the day, prefering bright sunny days from June to September; it doesn't work on cool, cloudy days. You won't have much trouble knowing whether it is working by the way the sheep act, as they huddle together, then one will dash around quickly and may stick its nose in the ground. You can readily see they are trying to get away from something that is after their noses. The larva is deposited on the membrane of the nose and works its way up into the frontal sinuses, where it remains until the following spring, something over ten months. The sign of its presence is a discharge from the nose first becoming thick and mixed with blood varying according to the number of bots in the sinus and the amount of damage. There is no treatment, when once they get in the nose, the effort must be toward prevention. In valuable flocks that are turned out in the morning and evening and kept in darkened quarters during the heat of the day, there is very little trouble but, of course, that is not practical with the ordinary farm flock. It is recommended that salt be placed in two inch holes in logs and tar smeared around the holes so the sheep will get it on their noses. It is common sense in this country, on account of dogs, that sheep be allowed in the sheep barn at night and they may be caught and the nose carefully tarred with a paddle every two or three weeks during the time

the fly is working. It only takes a few minutes to handle the average farm flock and then it is done right and the damage prevented. Of course, there is an operation of trephining the sinus and it may be used for very valuable animals, if the infestation is so serious that you think there is danger of death.

Stomach Worms.—Rams and mature sheep are more resistant to the stomach worm than lambs, although aged sheep are sometimes killed by the parasite. Prevention by rotation of pasture and careful hygiene is always advisable, but where farms are equipped with permanent pastures and cannot be rotated on the usual four year plan, it is possible still to raise sheep although the parasites will have to be fought continuously. Crop rotation and pasture rotation is the ideal thing as you know, but on some farms it is pretty hard to work out. This parasite may be carried over in the mature sheep and the pastures infected in the spring. I always advise treatment of the ewes during the extremely cold weather in the winter season, if they are well cleaned out at that time it seems to keep the infection down. While I have not conducted critical tests or controlled experiments along this line, I have been able to keep flocks in a good condition by following this method of treatment. Lambs should be watched carefully, and if symptoms of stomach worm infestation are present they should be given immediate treatment.

The symptoms of this disease are general unthriftyness, the lambs are pot-bellied, the wool is dry and harsh and the skin dry and parchment like. Advanced cases have edema of the jaw. Sometimes you can see the worm in the droppings and, of course, a microscopic examinations will demonstrate the presence of their eggs. Examining the flock—is it advisable to hold an autopsy? If you are in doubt and the owner is in doubt, I would say yes; if not, I see no necessity of sacrificing a lamb when the symptoms are so plain.

The treatment. The flock should be kept without food for, at least twenty-four hours. and water for at least twelve hours, then the 1¼ ounces of copper sulphate and 1 ounce of Black Leaf 40 to the gallon of rain water, varying the dose from 1½ to 3 ounces. The 1-ounce dose is plenty for a lamb three months old. The animal should be kept up for six or seven hours after treatment, then given just a little oats. If it is impossible to change the pasture, it may be necessary to treat again in thirty days. You should apply the treatment yourself.

You can readily understand that when a flock owner calls regarding his sheep he expects you to do something. He would not come to you if he did not. He very likely has read bulletins, papers, pamphlets, etc. He has listened to the radio and consulted learned men of fluent pen and eloquent tongue, but he has not gotten what he wanted and needs—something done. That man wants a careful examination made, the appropriate medicine furnished and the administration made by you. The flock owner has been fairly loaded with advice. He doesn't want that; he wants service and my experience is, he is willing to pay for it and it is well worth a reasonable charge. He wants results. It makes no difference and you need not tell him whether you use nitro glycerine, asafetidia or copper sulphate, just so he gets the results he wants. When you make your examination visit, the farm condition should be alertly scrutinized and nothing left out that will aid in the betterment of the flock, consistent with economy and labor.

FOWL TYPHOID STOPPED WITH AUTOGENOUS BACTERIN

A flock of over two hundred hens were suddenly beset by a diseased condition that caused a loss of about 30 birds in two or three days. Sick birds taken to a laboratory were autopsied and cultures taken from various tissues. From the heart blood and liver, pure cultures of a Gram negative motile rod was obtained. (This organism later identified by cultural means as B. Sanguinarium). A bacterin was made in which this organism was incorporated with avian strains of streptococci, bipolar and colon-typhoid group and the flock treated in doses of 1cc and 1½cc at five-day intervals. Not

a single bird became ill after the first dose and all sick birds recovered.

Buffalo, Wyo. W. Hampton.

A FOREIGN BODY IN THE STOMACH OF A DOG

Subject.—A Six-months-old Dalmatian, bitch.

History.—The animal was dull. She showed extreme thirst and vomited frequently. This had been going on for three days.

Symptoms.—The most marked symptom was the frequent vomiting. She could retain only a small amount of water. We found the animal greatly depressed and in a generally poor condition. A complete anorexia was present. Palpation for the possible presence of a foreign body gave negative results.

By the use of the Roentgen rays, a distinct picture was produced showing the presence of some foreign body in the stomach.

Treatment.—One-twentieth of a grain of apomorphine in tablet form was placed on the conjunctiva. This was given with the intent that the foreign body might be brought up during the act of vomiting. The animal was carefully watched and the vomitus examined to see if the body had been ejected. This had not taken place.

Enemas of warm, mild sodium bicarbonate solution were given at regular intervals but were of no avail.

Finally it was necessary to resort to removal by surgical means. A laparo-gastrotomy, as described in the previous case, was performed and the object removed.

X-Ray Photograph Showing Bottle Cap Inside the Stomach

The animal was discharged from the hospital in ten days, after an uneventful recovery.

Conclusion.—The foreign body was found to be a metal bottle cap about an inch and a quarter in diameter. Its presence produced an irritation of the gastric mucous membrane, thus producing the symptoms of an acute gastritis.

The roentgenography and surgery in this and in the preceding case were performed by Dr. A. W. Meyer of New York City, assisted by the writer.

A. H. Kleinfeld.

Union City, N. J.

Small Animal Clinic, Veterinary Conference, Ohio State University

Fracture of the Humerus

Subject.—Greyhound, aged, with considerable swelling of the carpus and the foot of the left front leg, which was carried, and extremely sensitive at the elbow.

Clinician.—F. E. McClelland.

Diagnosis.—Fracture of the distal end of the humerus probably extending into the articular surface.

Treatment.—The leg was padded with cotton from above the elbow to the foot, and pledgets of cotton placed between the toes. The bandage was put on this and a splint of basket wood, soaked in warm water fitted to the leg and over the top of the shoulder, and bandaged snugly.

The bandage was thoroughly wet on the outside with a solution of sodium silicate, which was worked in by squeezing and massaging. The directions were to return the animal in ten days for the removal of the bandage and sooner if it showed pain or restlessness.

Asked what fee should be charged for such work, the clinician stated that the charge in the usual case was $10.00 for the original treatment and no charge would be made for removing the bandage.

He cautioned against placing the splint on the medial aspect of the leg, since to do so increased the liability to cutaneous necrosis.

The clinician stated that an x-ray photograph should always be taken of such cases before the splint was put on and preferably after it was removed. Asked the charge for the X-ray photograph, he stated that it depended upon the circumstances. The charge would either be $5.00 or nothing, that a veterinarian should use the X-ray on all such cases as a routine measure for his own information, but that in the ordinary run of practice, he would probably be able to make a charge for considerably less than half of the X-ray photographs that it was necessary for him to take.

He stated that if a patient were a young animal, the bandage would be removed in seven days.

Coxo-Femoral Dislocation

Subject.—Airedale, three years old, with a dislocation of the right hip joint.

Clinician.—F. E. McClelland.

This dislocation was of long standing. The head of the femur rested on the rim of the acetabulum and could not be forced into place. A sort of false joint had been formed.

It was stated that nothing could be done to benefit the animal.

Dislocation of the Patella

Subject.—Heinz' hound, with dislocation of the patella which could not be moved into place, and permitted only 5% of the normal flexure of the joint.

Clinician.—F. E. McClelland.

It is stated that in addition to the dislocation of the patella there had probably been a fracture of the distal end of the femur also. There was considerable exostosis about the joint.

The case was of long standing and deemed hopeless, so far as improving the function of the leg was concerned.

Asthma

Subject.—Boston terrier, two years old, wheezing loudly most of the time, the condition being exaggerated by excitement.

Clinician.—W. J. Lentz, Philadelphia, Pa.

The history of the case was that three weeks previously, following bathing, the animal had suddenly commenced making loud respiratory sounds. It was lively, had a fair appetite and when quiet would sometimes make no abnormal respiratory sounds for a considerbale period.

There was no abnormality in the mouth or glottis that would account for the wheez-

ing. Nor could any other cause be determined from inspection. The opinion was expressed that the trouble was functional, due to a spasm of the bronchi and bronchioles, or to a thickening of the mucous membrane lining the respiratory passages.

The clinician stated that he would put the animal on full doses of ammonium chloride and atropine, and for temporary relief would give it medicated vapor. Doctor McClelland stated that he had seen a similar condition as a result of a foreign body in a bronchus.

Indolent Wound

Subject.—German police dog, eight years old, with a fleshy enlargement half the size of an egg on the inner, anterior aspect of the carpus.

Clinician.—W. J. Lentz.

The history was that this enlargement was of about five months duration. It had been treated with embrocations and by blistering and finally had been incised. The operative wound was widely open. No discharge nor granulation.

The treatment advised was to loosen the skin from the enlargement and apply a stimulating ointment to produce healing. It was thought that some enlargement would remain permanently, but since it in no way interfered with locomotion, it was not advisable to attempt to dissect it out.

It was stated that the indolent condition of the wound to some degree suggested a trophic disturbance and if such were the case, it was not advisable to do any more cutting than was absolutely necessary.

Deafness in a Dalmatian

Subject.—Coach puppy five months old, stone deaf since birth.

Clinician.—W. J. Lentz.

It was stated that such conditions are congenital and were common, of course, in albinos and that we frequently see them in bull terriers. He stated that, of course, an examination of the ear for otitis should always be made when such conditions were brought on, and that a useful application for persistent otitis consisted of: Balsam of Peru, one ounce; glycerine, one ounce.

In those cases where the entire auditory canal was filled with granulations, the condition was one of papillomatosis and offers considerable difficulty in treatment. A needle cautery is about the best thing with which to remove the papillomata.

Erythema

Subject.—Chow chow, four years old, shedding rapidly, and over a considerable area, the hair was so thin that the skin showed through it.

Clinician.—W. J. Lentz.

It was stated that the condition might be due to tapeworm infestation and the first thing to do would be to make sure in the matter, or to administer tapeworm treatment, but the probabilities are strong that the condition is due to improper diet and that the diet should be changed.

It was stated that it costs a good deal to feed a dog right and all dog raisers go broke sooner or later if they must depend upon raising dogs for the income they get out of them, for the reason that if you feed a dog right, you have to put into him more than you can get out of him.

It could be seen easily that the skin was too red over a considerable area of the body in this dog, and that this might be due in part to the basic condition and again it might be due to various applications that had been used in treatment, and possibly even to the way in which the dog had been bathed. The right way to bathe such a dog was to give him an egg shampoo, working the egg thoroughly into the hair, and then washing off with tepid water.

Generalized Pruritis

Subject.—Chow chow, one year old, with the hair practically all off the back and sides.

Clinician.—W. J. Lentz.

It is stated that the condition was probably due to an improper diet and certainly any treatment must comprise in part a careful regulation of the diet. Some areas of the skin were bright red and the clinician

said that it might be due either to scratching or to furunculosis developing; that the condition was a difficult one to combat; that treatment successful in some cases consisted in giving the animal tablets of manganese dioxide (five grains daily) and applying a copper sulphate ointment.

Pyometra

Subject.—Chow chow, seven years old, fat, unsteady gait, stiff all over, rheumatoid symptoms.

Clinician.—W. J. Lentz.

This dog had a history of having been in this condition for three months. The owner was anxious to breed her but had been unable to get her in whelp.

The clinician stated that the case appeared to be one of pyometra and on examination found a very small quantity of pus in the vagina. He prescribed Blaud's pills, potassium iodide and quinine, and, at the start of the treatment, to give two drams of saturated solution of magnesium sulphate three times daily.

He also stated that if the condition did not clear up within four weeks, the uterus should be removed. The ovaries, however, should not be removed.

Parasitic Otitis

Subject.—Cat, eleven months old, unable to get up when down, but when placed on its feet was able to walk unsteadily.

Clinician.—W. J. Lentz.

Examination revealed *Otodectes cynotes* in the auditory canal. The cat had attacks of slight rigidity and some hyperesthesia of the skin.

The diagnosis was meningitis, the result of a parasitic infestation of the middle ear.

The ear condition should be cleaned up at once; that was all that could be done. The prognosis was very unfavorable. The cat would likely die in the next few hours.

Doctor Hobbs stated that this cat's mother had died one or two days before this one was noticed to be affected, and had shown the same symptoms that this one showed. On autopsy the middle ear was found to be involved.

FOREIGN BODY OBSTRUCTION IN THE ESOPHAGUS

Subject.—A year old French bull, male.

History.—The animal vomited frequently. Small quantities of food which he had taken were immediately regurgitated. The animal drank water, which it was able to retain. Retching and salivation were noted. These symptoms were noticed by the owner about five days previous to our examination.

Symptoms.—The patient showed the same symptoms as were described by the owner. The head was somewhat extended and the respirations were labored. The animal had an anxious expression. He showed some evidences of emaciation. Other general symptoms were negative.

An esophageal obstruction was suspected and a stomach tube was passed. This went clear down to the stomach without an apparent difficulty. This complicated the diagnosis.

A series of radiograms were taken, one of which is here shown.

The tube extends a very short distance posterior to the lighter area. This darker area extends about ⅝ inch above the tube and about ⅛ of an inch below. The area is almost square with the exception of what appears to be a marked prominence extending about ½ inch more anteriorly on the dorsal border, and is about ¼ inch wide.

A positive diagnosis of foreign body in the esophagus was made. The body might have been shoved to one side in such a manner as to permit the easy passage of the stomach tube.

Treatment.—A laparo-gastrotomy was decided upon. A subcutaneous injection of ½ grain of morphine sulphate was made. Thirty minutes later the animal was placed on the operating table, and the operative area shaved, disinfected by painting with tincture of iodine, and anesthetised. An incision was made on the median line about an inch behind the sternum. The stomach was withdrawn from the abdominal cavity and placed on sterile cheese-cloth. An incision was made at the greater curvature and at right angles to the long axis of the stomach. Digital examination of the ter-

minal portion of the esophagus, revealed the presence of a hard object about a half inch anterior to the stomach. By means of a pair of long curved dressing forceps the body was carefully drawn into the stomach and removed.

The opening of the stomach was closed with two rows of sutures, first with a continuous row through all three coats, and then a continuous row of Lembert sutures. A round pointed needle with a number 0 medium hard chromic gut was used. The muscles and skin of the abdominal wound were sutured separately with interrupted sutures, a boric acid pack applied, and bandaged.

All food was withheld for twenty-four hours. After this, a liquid diet was maintained for a few days and then followed by the regular diet. The animal made an uneventful recovery. The abdominal stitches were removed in five days. The case was discharged ten days following its admission to the hospital.

Conclusion.—The foreign body was a piece of bone of peculiar shape. It was flat and about ¼ inch in thickness. One border was about an inch and a half long and the opposite border about an inch and a quarter long. It was about an inch wide at its broadest point which faced posteriorly. At the dorso-anterior aspect of the bone, there projected a small prominence. This was about ½ inch long and about ¼ inch in diameter.

The bone was lodged in the esophagus in an upright position. It was close to the left side of the wall of the esophagus. The lumen of this organ was greatly distended.

X-Ray Photograph—with a Stomach Tube Passed Down to the Region Just in Front of the Cardia of the Stomach

The thinness and shape of the bone, its close apposition to the esophageal wall, and its position are factors which are probably responsible for the phenomenon of passing the stomach tube without detecting the foreign body.

A. H. Kleinfeld.

Union City, N. J.

Ovine Brucelliasis (Bang's disease) occurred in a band of sheep on Vancouver Island according to E. A. Bruce. This is probably the first report of this malady in sheep in North America.

Observations Relative to Swine Immunization

By FRANK BREED, Lincoln, Nebraska

IN REVIEWING the history of the immunization of swine against hog cholera the results twenty years ago seemed in most instances to be more satisfactory and less trouble to the veterinarian than we are having at the present day.

Well informed men have stated many times, particularly in research and investigational work, that an animal properly immunized would not die of cholera at some time in the future. These statements were made a few years back, and I believe until within the past six or seven years they held quite true to form, but since 1925 apparently the difficulties encountered in the immunization of swine have increased very materially. By these difficulties, we mean sickness in the herd within the first four to fourteen days following the act of immunization and likewise in those instances where the immunity seems to have been lost, to a certain degree, within a period of four to six months after vaccination. These problems are staring the veterinary profession in the face and it is going to be very necessary that they be given a great deal of thought by the investigators of both the Bureau of Animal Industry and those connected with educational institutions and also by practicing veterinarians.

From the standpoint of the Bureau of Animal Industry, the scientific methods of manufacture of anti-hog cholera serum have been perfected very materially during this period of time and I believe it is a consensus of opinion that the serum produced and placed on the market today is, without a question, the best product of its kind that has ever been produced. Still, we continue to have these troubles even in greater proportion than back in the days when the production of anti-hog cholera serum was not under the most ideal conditions.

During the past five or six years there has been a great deal written, quite a bit of investigational work carried out and a great deal of discussion at the various meetings and conferences relative to problems immediately following vaccination. This subject has been discussed from all angles and scientific evidence has shown some of the reasons why we many times obtain these unsatisfactory results. Therefore, the writer does not desire to discuss the subject from this standpoint.

However, it seems as though the subject has been approached entirely from the wrong angle. This may have resulted from the fact that these difficulties were thrust upon the practitioners without warning and naturally demanded immediate attention in order to control them after they had developed. All the various institutions have put forth every effort to assist the practicing veterinarian after he was in this trouble. This is a case of placing the cart before the horse. It would seem that more constructive work could be accomplished by attempting to lay down certain ways and means whereby the practitioner can be cautioned and in many instances he can possibly prevent these unsatisfactory results.

In studying this situation, particularly after having the opportunity of going into the field and observing the conditions, we find the average practicing veterinarian when called upon to immunize a herd of swine obtains information relative to three problems only. Namely: "How many animals do you have to immunize?" "Approximately how much do they weight" and occasionally "Have you lost any animals lately?" With this information at hand, the custom in the past has been to proceed with the immunization of the herd. In many of these instances, what appeared to be a normal and healthy herd of pigs have been immunized with the result that in a period of four to fourteen days following administration of the serum and virus, they had

a herd of pigs on hand sick with acute gastro-enteritis. In some instances the losses were slight and in others exceedingly great.

On the other hand, there have been instances in which the animals remained apparently normal but were later exposed to hog cholera virus, and a small percentage succumbed to this disease. Now, the question presents itself, "Why should we have these irregularities?" The product which we are using is superior to that which has been produced before. The virus is checked more carefully for purity and means are taken to protect it from outside unfavorable influences. Therefore, can it be the serum and virus, or is it the irregularities of the pigs? For purposes of discussion we will assume that it is due to irregularities of the pigs.

In order to intelligently understand all these facts it is necessary that we go back into the history of animal husbandry, and particularly that of the swine industry. During the past twenty years the number of swine in this country has increased by leaps and bounds. There has been a great demand for the early farrowing of pigs in order to place them on the early market. Instead of planning to place on the market one litter of pigs per sow in a period approximately of twelve months. these animals are forced so as to place two litters of pigs on the market during that period of time. Therefore, to begin with, we have an animal born at a season of the year which is not to its advantage. Furthermore, it is kept under such conditions and fed such rations as to produce the greatest amount of growth in the shortest period of time. By so doing we are defying more or less the laws of nature. Therefore, we shall conclude that right in the beginning we do not have the strong, healthy, robust animals with which to work that we had twenty years ago.

I believe I am correct in making the statement that in most territories where trouble following vaccination is more or less prevalent, this trouble is encountered if at all in the herds following spring farrowing, and in the same herds following fall farrowing the difficulties are very materially reduced.

Immunity is a result of the reaction which takes place between the antigen (which may be either live virus, attenuated virus or dead micro-organisms) and the animal body, with an increased resistance for the specific antigen administered. Our feeling is that this definition should be corrected to read "a normal animal body," because we feel that a virus administered to an animal body harboring pathological conditions, just recovering from an acute infectious disease, just recovering from a case of anemia, or an animal exceedingly heavily infested with parasites or those suffering from a calcium or phosphorus deficiency will not produce the high-grade immunity that the normal and healthy tissues will produce.

The veterinarian should ascertain certain facts prior to the immunization of a herd of swine which will be of great value to him in determining in his own mind as to whether he will be able to establish a high grade of immunity or whether he is liable to have acute gastro-enteritis following vaccination or whether the immunity so established will be of low grade and of comparatively short duration which may be reduced to such a point as to allow the animal to develop cholera at some time in the future. I feel it is advisable and necessary that the veterinarian obtain herd information such as:

A. Number of pigs farrowed per sow.
   1. Whether or not there were abortions in the herd.
   2. Whether any pigs were born dead.

B. The number of animals lost between the time of farrowing and time of immunization from the following causes:
   1. Infectious diseases.
      a. Pig typhus or scours of infectious nature.
      b. Swine erysipelas.
   2. Metabolic diseases.
      a. Nutritional anemia.
      b. Deficiency of calcium and phosphorus.

If any one or more of the conditions listed under "B" conditions has occurred in

the herd during the first approximate eight weeks of life of the pig, the veterinarian can feel fairly well satisfied in his own mind that there will be some carriers left among the infectious group and there will be pathological conditions still remaining in the animal body from the deficiency group. If one or more of the conditions listed under "A" has occurred he probably has to contend with bad breeding practices which may have left the stamp of constitutional weakness on the progeny. Therefore, he has before him at that time a problematical herd for immunization and the results may not be any too satisfactory.

In those herds where the history shows that there has apparently been a deficiency such as nutritional anemia or a calcium deficiency, the latter being manifest by the sick pigs showing symptoms of St. Vitus dance and also evidence of rickets, the owner should be advised in these instances that loss of animals may occur at a later date. Of course, if any of the animals are showing rickets or nervous disturbance at this time, it is advisable to first correct the condition before treating the herd.

In the instances where acute infectious diseases have occurred, particularly pig typhus or infectious pig scours, there is a possibility that an acute infectious disease independent of cholera may develop within the first four to fourteen days following vaccination. Therefore, the necessary precautions should be taken to counteract this secondary infection as far as possible prior to vaccination and the owner advised that even though the herd appears to be apparently normal at the present time, this condition may develop. By this means the confidence of the client is obtained and if the secondary disease does develop, the veterinarian is in position to handle it with much better cooperation.

In the immunization of swine in territories where trouble has existed in the past and also in territories where there has been no trouble, it is advisable to prepare the herd for the operation, for it is frankly admitted that when anti-hog cholera serum and the average dose of virulent hog cholera virus is injected into susceptible animals, there follows a complete systemic reaction, placing the animal in a more susceptible state to the various forms of infectious disease than prior to vaccination. Therefore, we feel it is more advisable to prepare these herds for this immunization.

In preparing the herd for immunization, practical experience in the field has shown that reducing the diet is very beneficial. By this, we mean reducing the concentrates, taking away the corn and tankage, placing the animals on pasture if possible and feeding them on whole oats soaked in an alkaline solution. This seems to give tone to the body and in case there are chronic infections lurking throughout the digestive tract, we desire to alkalinize these tissues so as to overcome intestinal infection. This treatment should be continued for a period of about a week or ten days prior to vaccination if possible, and the same treatment of the herd should continue for a period of at least twenty-one days following the operation, permitting the animal body to come back to normal and then bring them back onto the feed of concentrates.

Many owners, particularly those of purebred herds, hesitate to follow this advice, due to the fact that they contend there is too great a shrinkage in the animal during this period of approximately one month. However, they lose sight of the fact that during this period of time the bony structure of the animal body is continuously growing and when the animals are put back on the full feed of concentrates, they are in condition to take on the fleshy portion of the body far more rapidly.

This method has been used, particularly in territories where acute gastro-enteritis has been quite prevalent and where previously they have had a great deal of post-vaccination trouble, and the results have been very satisfactory.

The subject of internal parasites has been discussed many times. The opinion of the writer is that animals infested with ascarids are not difficult to handle from this standpoint unless the animals are showing clinical evidence of parasitism. Of course, in

these instances, it is advisable to first treat for the parasites, not at the time of vaccination but about ten days prior to vaccination, permitting the animals to come back apparently to normal before immunization. We must take into consideration, however, that in those herds where parasitism is very pronounced, in all probability, there is lurking in the herd, together with the parasites, the various filth borne diseases that are ordinarily concomitant with heavy parasitism, particularly typhus or acute gastro-enteritis.

About the most difficult problems for the veterinarians to handle are those instances where the herd develops a so-called severe reaction following immunization. These we straighten out fairly satisfactorily with small losses and with the owner entirely satisfied. The animals seem to progress and to fare well for a period of ninety to one hundred twenty days. About this time they are forced on full feed and after a few weeks on the concentrated diet, the animals are liable to develop an acute gastro-enteritis due in the majority of instances to infection. In most of these instances, the herd contains a number of carriers and sometimes hog cholera virus is also present. These instances are exceedingly difficult to explain to the owner. The animals were supposed to have been immunized but we find in a certain percentage the immunity is lost and they are suffering both from acute infectious gastro-enteritis and hog cholera. The losses may be fairly heavy. After investigating a number of herds similar to this, we have come to the conclusion that in many instances of these so-called severe reactions following immunization, it is quite possible that at that time they had a slight attack of gastro-enteritis or pig typhoid, establishing a number of carriers throughout the herd and the immunity established was not of high grade. Therefore, due to the chronic condition existing in a certain number of the animals in the herd, it has again developed and permitted the virus to become pathogenic in this herd.

Whenever one of these severe reacting herds are reported, it is advisable to make a careful examination and determine if possible if infectious gastro-enteritis is the cause at that time. In those instances, the owner should be advised that this same condition may reoccur in the herd at a later period and that hog cholera virus may also be present.

An attack of "flu" may also interfere with the degree of immunity established or in case a high grade of immunity had been established in the beginning, a severe attack of flu at a later period may cause a certain percentage of this immunity to be lost. Herds that seem to have a number of attacks of flu within a comparatively short period of time should be investigated very carefully for the possibility of some other form of an infectious disease.

A condition which has given quite some difficulties in a few instances in the past has been apparently an acute outbreak of swine erysipelas. This in many instances resembles hog cholera and it should be studied carefully to determine definitely that there is not cholera virus present.

In the correlation of these few facts, we have not attempted to lay down any hard and fast rules whereby the practitioner can handle all herds of swine without having trouble immediately following vaccination or at some later date. I wish we could do that, but we do not have sufficient information to accomplish this result. The idea was to attack the swine problems from the beginning, to stimulate the investigators and also the practitioners to make a careful study of the situation from the angles cited above. The material laid down here is from field observation and it is possible this information may be of some value to many practitioners at this time.

I cannot feel that our increased difficulties are a result of the improper production of the serum or virus or the improper administration of the serum and virus by the veterinarian, but rather that it varies in the herds of swine which have changed from the standpoint of handling, production and feeding during the past twenty years.

Infectious Laryngotracheitis of Fowls

By W. R. HINSHAW, Davis, California
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INFECTIOUS laryngotracheitis is a respiratory disease principally confined to chickens on the North American continent. The disease is characterized by its sudden onset, respiratory symptoms, and the rapidity with which it sweeps through a flock. It is known to have existed in the United States and Canada at least since 1922, and in all probability for a much longer period. It became widespread in several poultry producing sections during the summer, fall and winter of 1924-25, and has increased in economic importance annually since that time. According to data collected by the 1930 Poultry Disease Committee of the American Veterinary Medical Association,[1] the disease exists in at least 39 states and in two Canadian provinces. Common synonyms are gaps, infectious bronchitis, infectious tracheitis, and Canadian flu. According to Kernohan[2] and Graham, Thorp and James,[3] the name infectious laryngotracheitis is most descriptive of the disease.

Etiology

The etiology has not been completely worked out. Beaudette,[4] Beach,[5] and Graham, Thorp and James[6] have reported a filterable virus as the causative agent. Graham[7, 8] and his coworkers have also succeeded in isolating a "pleomorphic micro-organism with coccoid, ovoid and granular rods . . . , pathogenic for mature fowls, young chicks and mice," from acute and subacute cases of the disease.

All ages of chickens are susceptible. Data collected recently in California by the writer showed that 30% suffered before five months of age and 50% contracted the disease during the early laying periods of their lives (5-8 months). A disease causing similar symptoms has caused great economic losses to the baby chick industry in the mid-west during the past year and has been referred to by Schalk and Hawn.[9] Beaudette and Hudson,[10] Kernohan,[2] and Sawyer and Hamilton[11] have reported the disease in young chicks in the eastern and western states. Fowls other than chickens do not as a rule appear to be susceptible under natural conditions, though Kernohan[12] has reported a natural outbreak in pheasants. Beach[13] was unable to reproduce the disease by inoculation into sparrows, wild doves, crows, starlings, pigeons, ducks, rabbits, guinea pigs, rats and swine.

Mode of Transmission

There are at least four divisions of the poultry industry affected by infectious laryngotracheitis, viz., the commercial egg plant, the brooding and broiler industry, the

[1] American Veterinary Medical Association. 1930, Rept. of Special Committee on Poultry Diseases. *Jour. Amer. Vet. Med. Assoc.*, 77 (n. s. 30) 503-506.

[2] Kernohan, George. 1931, Infectious laryngotracheitis of fowls. *Jour. Amer. Vet. Med. Assoc.*, 78 (n. s. 31): 196-202 Feb.

[3] Graham, Robert, Frank Thorp, Jr., and W. A. James. 1930, A note on avian laryngotracheitis. *Jour. Amer. Vet. Med. Assoc.*, 77 (n. s. 30): 587-594 Nov.

[4] Beaudette, F. R. 1930, Bronchitis in poultry, *New Jersey Agriculture* 12: 3-4 May.

[5] Beach, J. R. 1930, The virus of laryngotracheitis of fowls. *Science*, 72 (1877) 633-4, Dec. 19.

[6] Graham, Robert, Frank Thorp, Jr., and W. A. James. 1931, A filterable virus-like agent in avian laryngotracheitis, *Jour. Amer. Vet. Med. Assoc.*, 73 (n. s. 31), 506-517.

[7] Graham, Robert, and Frank Thorp, Jr. 1930, Pleomorphic micro-organism associated with acute avian laryngotracheitis. *Jour. Inf. Diseases*, 47: 83-86. August.

[8] Graham, Robert, Frank Thorp, Jr., and W. A. James. 1930, The pathogenicity of a pleomorphic micro-organism isolated from avian laryngotracheitis. *Jour. Inf. Diseases*, 47: 340-344, Oct.

[9] Schalk, A. F., and M. C. Hawn. 1931, An apparently new respiratory disease of baby chicks. *Jour. Amer. Vet. Med. Assoc.*, 78 (n. s. 31): 413-422. Mar.

[10] Beaudette, F. R., and C. B. Hudson. 1931, Some observations on an outbreak of infectious bronchitis in battery brooded chicks. Proceedings of the 22nd Annual Meeting Poultry Science Assoc. July 9-11, 1930, pp. 74-77. Published Jan. 1931, MacDonald Coll., Quebec, Canada.

[11] Sawyer, C. E., and C. M. Hamilton. 1930, Infectious bronchitis, Quarterly Bul., Washington Agr. Exp. Sta No. 18-W (n. s.): 36-38, Oct.

[12] Kernohan, George. 1931, Infectious Laryngotracheitis in pheasants. *Jour. Amer. Vet. Med. Assoc.* 73 (n. s. 31), 553-555.

[13] Beach, Jr. Personal communication, March 24, 1931.

hatchery, and the poultry fattening establistments. The well isolated farm flock seldom suffers from this disease unless introduced by the purchase of stock from infected areas. Poultry sections like those existing at Petaluma, California, and at Vineland, New Jersey, are examples of poultry communities that suffer the greatest losses from this disease. In fact, any condition which involves the congregating of large numbers of birds into a small area favors its development and yearly propagation. Poultry shows, fairs, battery brooding plants, broiler plants, feeding and fattening stations, and poultry subdivisions of all descriptions thus have ideal conditions for this disease to thrive.

Concentration of poultry ranches, and continuous brooding of chicks in a community are probably the most important factors influencing the yearly recurrence and spread of this disease in the rural districts. Sanitation, drainage, overcrowding, parasitism and lowered resistance because of fowl pox vaccination, malnutrition, or other diseases and exposure due to shipping are other important predisposing factors.

There appears to be a seasonal trend to the disease with the late summer, fall and early winter being the times of greatest number of outbreaks. However, this varies in different parts of the country and it is difficult to determine whether or not it is due to a seasonal or age influence. The increasing number of outbreaks that are being reported in chicks suggests that the seasonal trend may change in localities where chicks are primarily affected.

Symptoms

The sudden onset of the disease makes it difficult to observe any premonitory symptoms, but often a foaming or watering of the eyes of a few birds in a flock gives a warning signal of the approaching danger. Poultrymen commonly give such a history and may also report the sudden death of a few birds with no previously noted symptoms during two or three nights previous to the observation of dyspnea. Respiratory symptoms appear suddenly and are usually observed for the first time in the morning or late at night. The affected bird will extend its head forward, open its mouth and raise the head upward during inhalation. During exhalation many times the subject will sit with the neck arched and the beak drawn towards the breast and show great exhaustion. Labored breathing continues, but is interrupted by fits of coughing during which bloody mucus will often be expectorated. These symptoms and the finding of blood stains on the roosts and walls of the house are diagnostic. The temperature of sick birds may go as high as 112° F., but a marked increase above normal is not always observed. According to Kernohan[2] the period of incubation is from seven to twelve days in natural outbreaks. Death is most often due to asphyxiation caused by an occlusion of either the superior or inferior larynx with the inflammatory discharge from the bronchi and trachea.

Course

The normal course of the disease varies within wide limits, but is seldom longer than 21 days. In data compiled by the writer on 75 outbreaks involving 56,010 birds, the average course was 15 days with extremes of four to 39 days. In a composite grouping of data from 25 flocks which were in production, 85% of all deaths occurred by the end of 15 days and 98% of the total mortality occurred by the end of the 21st day. The greatest mortality was on the 11th day and 75% of all losses were from the 5th to the 15th day.

Autopsy Findings

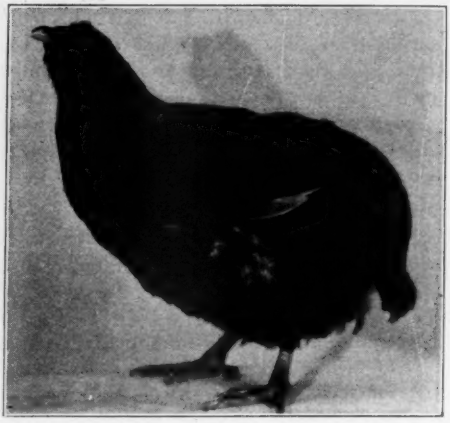
Unless complications exist, few, if any, pathological changes are noted except in the respiratory tract, and here they are confined principally to the larynx and trachea. Varying degrees of inflammation in the trachea, the superior and inferior larynx and occasionally in the bronchi are observed. Weaver[14] called attention to darkened areas in the lung due to extravasated blood and gave this as the source of the blood coughed up by the bird, some of which is found in the trachea. In the trachea there is usually

[14] Weaver, C. H. 1928, Infectious bronchitis of fowl. Rept. of Poultry Div., Dominion Experimental Farms, Dept. of Agr. Ottawa, Canada, 1928. pp. 67-69.

an accumulation of muco-purulent exudate mixed with blood which in the later stages becomes caseated and deposited over the surface of the mucous membrane of the trachea and often extending into the inferior larynx and into the bronchi. In advanced stages this croupous exudate may collect around the laryngeal openings and is probably the most common cause of death by asphyxiation.

Differential Diagnosis

There is probably no disease prevalent in this country at the present time which might



Hen Suffering from Infectious Laryngo-Tracheitis

be mistaken for a typical outbreak of infectious laryngotracheitis. Fowl plague and Newcastle disease (Doyle[15]) both may produce respiratory symptoms similar to this disease, but the lesions on autopsy will definitely distinguish it from either of them. Tracheitis or laryngitis, due to the fowl pox virus and miscellaneous causes, may produce similar symptoms, but again are easily differentiated because of the characteristic bloody, purulent discharges when coughing, course, mortality, and lesions.

Morbidity, Mortality and Immunity

In the acute outbreaks practically every bird in the flock suffers from the disease. Graham, Thorp and James[3-6-7-8], have described a subacute type which is accompanied by slight or no clinical evidence of the acute symptoms. Occasionally only a few birds will show typical symptoms.

The mortality reported by investigators varies greatly. In the 75 outbreaks referred to above the average mortality was 11.15% with extremes of 0.0% to 48.66%. In one flock typical symptoms appeared without any mortality.

One attack of the disease produces an immunity.

Effect on Egg Production

The disease causes a marked drop in egg production in laying birds, beginning the fourth or fifth day from the onset and continuing for an average of 30 days. In composite data on 25 flocks totaling 14,574 birds, collected by the writer and Dr. E. E. Jones of the Los Angeles County Livestock Department, the minimum production during an outbreak was reached on the 18th day following the onset of the disease and seven days after the maximum mortality. The production started to drop four days after the onset of the disease and reached the predisease percentage production 30 days later. The estimated loss in production in these flocks was 1,883 dozens of eggs and there was a total mortality of 1,916 birds. The total monetary loss was estimated at $3,200, and from these and other data it was estimated that the monetary loss from drop in egg production in producing flocks ranges from one-fourth to equal the loss from deaths.

Treatment, Control and Prevention

No satisfactory general flock treatment has been found for this disease. Weaver[14] suggests as a prophylactic measure the installation of a few drops of a 10% solution of argyrol or similar preparation into the eyes, nostrils and throat of birds brought to fairs, poultry shows, etc. Kernohan[16] reported negative results on the use of mercurochrome, argyrol, iodine, acriflavine, and cresatin as therapeutic agents for individual treatment. He also found vaporized coal

[15] Doyle, T. M. 1927, A hitherto unrecorded disease of fowls due to a filter passing virus. *Jour. Comp. Path. and Therap.* 40; 145-169.

[16] Kernohan, George. 1930, Infectious bronchitis in fowls. Bul. 494. California Agr. Exp. Sta. June, 1930. 22 pp.

tar disinfectants to be of no value in preventing losses.

Careful nursing, attention paid to the comfort of the birds, avoiding excessive excitement and proper feeding procedures have proved the most successful in curbing heavy losses from the disease. Veterinarians should always keep in mind that the principles involved in treating respiratory diseases of other animals are applicable to this disease. Prevention of death by suffocation can often be accomplished by the prompt removal of an accumulation of exudate in the superior larynx. If sprays are used at all they should be mild and of a soothing nature and applied with care in order to avoid exciting the birds. In an infected area where poultry farms are more or less congested, prevention of this disease becomes a community problem, and involves the proper attention to disposal of dead birds, manure, and litter; the control of mechanical carriers; the cleaning and disinfection of second-hand feed sacks and poultry crates; and the control of community sanitation, drainage, etc. In the Petaluma, California, district efforts to solve these problems are now being made by veterinary supervision under the control of the State Department of Agriculture. In this section the use by poultry men of a scavenger service for disposal of dead birds is helping to solve one of the most important problems of such subdivisions.

Prevention in a disease-free area consists in the prevention of introduction of the disease from infected areas. Although it has not been proved conclusively that apparently normal birds may be carriers, there is considerable evidence to support such a theory and efforts to prevent spread by this means must be considered. Birds that have previously had the disease should never be placed in pens with susceptible stock. The buying of hatching eggs and day-old chicks from healthy sources should be recommended always in preference to the purchase of adult stock for replacements, as a preventive measure in the control of all poultry diseases.

Poultry shows, egg laying contests, etc., have their place in the poultry industry, but it must be admitted that they are among our worst offenders as disease disseminators. If poultrymen who exhibit birds would sell them on the open market for food purposes following the exhibition they would solve many of their disease problems. However, this will not be done, and they should be cautioned regarding quarantine procedures following the return of the birds to the farm.

Poultry fattening stations have been able to prevent severe outbreaks by careful attention to purchase of healthy stock, improvement of plant sanitation and by shorter feeding periods. When outbreaks in these establishments occur all stock is culled and the plant thoroughly cleaned and disinfected before new stock is purchased. A similar procedure has been successful on certain poultry plants in isolated localities where the disease is not prevalent. Brooding and broiler plants have also been most successful in stamping out the disease by killing off all the birds and not restocking until a thorough cleaning and disinfection of the plant has been accomplished.

NEW DEVELOPMENTS IN RESEARCH ON FEEDING OF POULTRY*

The poultry business is in a depressed state all over the country, and Michigan poultry raisers are feeling keenly the record low price for their products that obtain at this time. Eggs are cheap and going to be cheaper.

Ninety-two per cent of the farmers in Michigan keep poultry. There is probably nothing else that a farmer could grow since the war that would make him so high a return on the investment as poultry.

The consumption of eggs in Detroit is now just about one-half what it was a year ago. The whole poultry industry, poultry raisers, hatchery men, wholesale dealers, storage houses and the banks that finance them, feel bad.

*Notes from an address by Mr. J. A. Hannah, East Lansing, Michigan, at the Eighth Annual Post-Graduate Short Course for Veterinarians, Michigan State College, East Lansing, January 26-30, 1931.

Michigan veterinarians do but little poultry practice. The poultry raisers have gone to the veterinary profession for help in the control of poultry diseases, and so far, have received but little assistance. To handle poultry practice successfully, the veterinarian must know not only poultry diseases, but he must be able to give practical information as well. Feed concerns, incubator manufacturers and others employ many service men who go over the country offering this practical information, and, to some degree, information as to the treatment and prevention of disease.

Low as the price of eggs now is, the good poultryman will continue to make a profit. However, most poultrymen will not make a profit until the price of eggs is higher.

To make a profit from eggs, three things are necessary: (1) The hens must be bred to lay; (2) they must be fed so that they can lay; and (3), disease must be controlled.

The ability to lay a large number of eggs has been bred into many strains of poultry in recent years. Not so long ago, a hen that would lay 200 eggs was looked upon as a high producer. Now there is a record of one hen that has layed 361 eggs in 365 days; another that has layed 358 eggs in the same period. There are a good many that have layed up to 350 eggs in the year, and there are a great many individuals that have layed more than 300 eggs. It is easily possible for the poultryman to provide himself with a good laying strain of hens.

Then, the well-bred hen must be fed to make it possible for her to lay. This feed is referred to by poultrymen as laying mash. The farmer should make it himself, using, so far as possible, grains of his own raising. A useful laying mash is made as follows: Bran, 20 pounds; middlings, 20 pounds; corn meal, 20 pounds; ground oats, 20 pounds; meat scraps, 20 pounds; bone meal, 2 pounds; finely-ground limestone, 2 pounds; salt, 1 pound.

In addition to this laying mash, some succulent food should be allowed. Alfalfa leaves is probably the most desirable.

The laying mash must be rich in animal protein. Vegetable proteins won't do. It is the meat scrap that makes the mash work. Dried milk can be substituted for the meat scrap to the extent of 50%.

In addition to the laying mash, the hens should have scratch grain. The usual manner of feeding is to allow 10 pounds of laying mash and 10 pounds of scratch grain per 100 birds per day

Hens must be allowed plenty of water. Two-thirds of the hen and two-thirds of the egg is water. A standard egg weighs two ounces, and, at 35c per dozen, the poultryman is able to sell water at $1.48 per gallon. In the winter time, in the latitude of Michigan, cod liver oil is necessary for hens.

If we are to obtain the best production from them, we should feed about one quart of cod liver oil per week per 100 hens. Formerly, the laying mash was fed wet; but it doesn't add anything to its value, except to urge pullets to produce earlier and possibly to delay moulting.

To obtain a profit from the poultry business, the poultry raiser must keep his flock free from disease. This means that the flock from which eggs are taken for hatching must be fed well; the eggs must be hatched right; the incubator must be kept clean; the chicks must be brooded well; the brooder house must be kept clean, and at the proper temperature; and, remember, you can't clean old ground. There must be no mistake in this procedure. No weak links in this chain leading up to the producing bird.

The mash for growing chicks, usually referred to as the Ohio ration, is very satisfactory. It consists of the following: Yellow corn, 60 pounds; middlings, 20 pounds; dried milk, 10 pounds; meat scrap, 5 pounds; bone meal, 4 pounds; salt, 1 pound. Feed all the chicks will eat all of the time. Give plenty of water and, in the winter time, feed 1% of cod liver oil

Another ration, referred to as the Moore ration, is very successful for growing chicks, and is made up as follows: Yellow corn meal, 36 pounds; middlings, 20 pounds; oat meal, 20 pounds; dried milk, 20 pounds; meat scrap, 5 pounds; alfalfa leaf meal, 5 pounds; steamed bone meal, 2 pounds; salt, 1 pound; cod liver oil, 1 pint, with plenty of water. Or, milk may be given for the drink, and the proportion of dried milk reduced

50%. Barley may be substituted for half the corn. Growing chicks should have scratch grain similar to that for laying hens.

The scratch grain for laying hens may be fed in hoppers or thrown in litter on the floor. If the floor is reasonably dry and the litter removed and the soiled litter replaced with clean litter often enough, one method is probably as good as the other; but for the chicks, the scratch grain, like the growing mash, should be fed from hoppers.

There has been a great deal of discussion as to when to begin feeding chicks. At first it was thought that they should be fed as soon as they would eat. Then it was thought they should not have any feed for 72 hours. It apparently makes no difference when the feeding is begun, and the present practice is to feed the chicks as soon as they will eat.

IMPORTANCE OF GOOD TECHNIQUE IN CONDUCTING THE INTRADERMAL TEST

When one is subjecting large numbers of cattle to the intradermal tuberculin test, the tendency may exist to become somewhat careless in technique. We should take special precautions in applying this test to avoid any criticism on the part of the owner, the state, or any other organization which we may be representing.

As a rule, there is no complaint to be made as long as all cattle pass the test satisfactorily, but immediately there are reactors uncovered in a herd some owners invariably submit some excuse or allege some defect in the work. It has been my experience that owners will attempt to criticize one's technique if they can or can find some defect such as not using absorbent cotton for cleansing the area; or they may criticize one for not properly sterilizing the syringe and needle prior to conducting the test on the herd. I don't say that every owner will attempt to blame the reactors on faulty technique on the part of the veterinarian, but I do maintain we as veterinarians should take every precaution against any criticism on the part of any owners.

Therefore I would suggest that a good syringe is essential in conducting this class of work. There are many different types of syringe on the market, but it is my opinion that we should select a syringe that can be properly sterilized. In order to attain this the syringe must be so constructed so that all parts are removable and can be sterilized by boiling. A syringe that gives very good satisfaction is one having the plunger made of steel and the glass barrel is of sufficient thickness that it can be sterilized readily.

I have encountered syringes with the plunger made of leather, a media for the growth of bacteria when it becomes saturated with tuberculin. On this syringe the glass barrel is so thin that it will not stand boiling. It is important to have these two parts of the syringe so constructed that they can be sterilized satisfactorily.

When the syringe is in readiness, filled with tuberculin, the attendant should be instructed to hold the animal firmly by the head. It is important to have plenty of absorbent cotton ready, have it dampened with ether. The right side of the caudal fold of the tail should be cleansed thoroughly with cotton and ether. The injection as all know, is made in between the two layers of the skin, being careful not to create any more irritation than is absolutely necessary. When the injection is complete, there should be a small swelling about the size of a small pea, which indicates that the tuberculin has been satisfactorily placed in the fold. This small swelling gradually disappears by absorption in a short time following the injection. By following this technique in each individual animal one will go far towards reducing the number of questionable swelling at the time of the interpretation of the test.

In conclusion, I would say that if we keep our technique on a high standard we will avoid criticisms from the owners or anybody else that might be interested in the test.

Quebec. M. I. L.

Book Review

ASEPSIS IN VETERINARY SURGERY

Jordanoff, P. Einführung der Aseptik in die Veterinärchirurgie. (Asepsis in Veterinary Surgery) 169pp. Gerold Verlag, Pössneck, Germany, 1931.

Ever since the late war the trend in Veterinary Surgery is more and more from the antiseptic wound treatment to the aseptic treatment, and rightly so. While admittedly the wounds in domestic animals offer somewhat different problems from those encountered in human surgery, yet, with the application of logical modifications, the methods of asepsis are entirely applicable to operations in animals. That they are also eminently practical, the reviewer, at present a student at the Ohio State University, can amply testify from his observations of the favorable results obtained through aseptic wound treatment at the Veterinary Clinics under the directorship of Dr. W. F. Guard.

The above-named treatise is intended as an outline of aseptic methods and such a guide should prove valuable to the general practitioner. For, the simplicity, neatness and efficiency of asepsis is one of the most ethical advertisements of the profession and a powerful appeal to the client. The booklet does not contain anything new in asepsis that is not already taught in American veterinary colleges or at veterinary conferences.

Twilight-Sleep

The section on narcosis and anesthesia (56pp), however, is quite up-to-date and worth study. The reviewer deems it expedient to present an abstract of the chapter on "Pernocton-Sleep," since references to twilight-sleep are altogether too rare in American and English Veterinary Literature.

Pernocton is the trade-name for the sodium salt of the secondary butyl betabromallyl barbituric acid of the formula $C_{11}H_{14}O_3N_2Br$ Na. It is manufactured by the firm J. D. Riedel-E. de Haën A. G., Berlin, Germany. It is used in a 10% solution in physiological salt solution. The dosage in man is 0.007-0.008 gm per kgm bodyweight with subsequent ether-narcosis. It has been employed in more than 200,000 persons and over 90 papers have been published on its use.

The dosage recommended for dogs, cats or monkeys is 0.03 gm (0.3 cc of the solution) per kgm liveweight. The injection is made intravenously without subsequent ether-narcosis, except in those cases in which, due to improper technic, deep narcosis does not result. In such cases a few ether inspirations will suffice to insure anesthesia. The slow absorption of Pernocton by the central nervous system being the decisive factor for the success of a useful twilight-sleep, the slow injection of the fluid becomes all important, the rate of flow of 1 cc per minute is recommended. Depending on circumstantial preferences the injection is made either into the ramus dorsalis of the vena saphena parva or into the vena cephalica antibrachii. In quiet dogs the injection can be made with the dog in the standing position.

The dog is placed upon the table, the veterinarian stands to the right of the dog, reaches with his right hand across and around the back of the dog to the distal end of the left thigh where the injection is made. The vena saphena may be compressed either with the left hand by the operator or with a rubberband. Unruly or vicious dogs will have to be restrained. It is important that the solution enters the vein. Injection into the perivascular tissue causes swelling and possibly phlebitis. In case the needle has punctured the opposite wall of the vein, it is safer to abandon the place of injection in favor of another vein.

The first sign of tolerance is the prolapse of the accessory eyelid. This symptom may be observed toward the end of the injection. The injection should be discontinued as soon as the reflexes of the skin and mucous membranes are lost, even if the calculated amount has not been wholly injected. Anesthesia sets in either during injection or from 3-4 minutes after its completion. The temperature falls continuously for several

hours (up to 6 hours) as much as 2-3° C. With the rise in temperature, awakening sets in. Anesthesia lasts from one to two hours, the sleep from five to ten or even 15 hours.

Pernocton has been used successfully in alleviating and curing certain diseases of the nervous system (chorea, tetanus, etc.). It does not affect the meat and it is therefore indicated in bujatrics. It is recommended as an humane method preparatory to slaughter according to Jewish rite. It would also seem advisable as a basal narcosis in horses. No casualties have been reported from therapeutic doses. The lethal dosage is 0.07 gm (0.7 cc of the solution) per kgm bodyweight. If slowly injected, euthanasia ensues in 1-3 minutes; quick injection causes euthanasia almost instantaneously.

The advantages of Pernocton-Sleep compared with other methods of narcosis are: its comparative safety, the absence of an exciting stage, the promptness of action, the sureness of anesthesia, the absence of damage to the vital centers and that it enables the lone veterinarian not only to do away with extra help but also to relieve his mind from constant attention to anesthesia.

Fritz Volkmar.

BORNA DISEASE AND ENZOOTIC ENCEPHALO-MYELITIS

Nicolau and Galloway of the Medical Research Council, England, have reviewed the literature and recorded the results of extensive investigations on Borna disease. These authors enumerate the various names under which this disease has been designated in various countries and give a rather detailed account of the outbreaks and occurrence of the malady throughout the world.

From their report, Borna disease of horses, cattle and sheep appears to be one and the same disease. The symptoms and lesions found in the nervous system are analogous. From cases of the disease in all three groups of animals a filterable virus has been recovered and shown to be responsible for the disease. In one instance the same filterable virus was demonstrated in a case of malignant catarrhal fever, however, Borna's disease may have occurred as a complication. One instance is recorded in which a deer appeared to be suffering from Borna disease.

The avenue of entrance of the infection was thought to be through the respiratory and possibly digestive tract. From observation of the authors, it appears as though the virus of Borna disease possess some properties common to those of rabies, poliomyelitis and other related diseases. Under favorable conditions this virus passes through bacterial proof filters. The virus is also resistant to the action of glycerine, but is sensitive to dessication, ultra-violet light and heat, and is destroyed by ether, chloroform and formaldehyde. It has not been propagated outside the animal body.

The disease is transmissible to rabbits by the feeding of food stuff containing brain tissue from animals dead of the disease. There is marked resemblance in the clinical aspects as well as in the lesions in the cord and spinal ganglia of this disease and poliomelitis in man. The virus of Borna disease is capable of passing through the placenta of a mare and infecting the fetus during intra-uterine life. The saliva and nasal secretion of diseased animals are charged with virus.

No evidence has been found that one attack of Borna disease confers an immunity in cattle and sheep. In one case at least Zwick found a rabbit which had been infected experimentally, developed the disease and ultimately recovered and could not be re-infected. It was further demonstrated that rabbits immunized against an equine strain of the virus were resistant to intracerebral infection with an ovine strain of Borna's disease.

Of the various medicaments used in attempts to treat affected animals urotropin gave the best results. According to some investigators 15 to 20 grams of urotropin administered in the earlier stages of the disease reduced the mortality from 80 or 90 per cent to 25 per cent.

A. T. Kinsley.

Reviews and Abstracts

Effects of Grubs Upon Animal Skin[1]

There are two species of the grub fly of cattle; the *Hypoderma lineatum* and the *Hypoderma bovis*. The two species are quite similar in form, history, size, life cycle and habits, one of the main differences being that the former deposits several eggs in a row, while the latter lays them singly. For the present purpose we may consider the two species together.

The eggs are laid on the animal's hair, generally near its heel; a single fly being capable of depositing during its life from 300 to 500 eggs. In less than a week the eggs are hatched and liberate larvae. The liberated larvae travel down the hair and enter the animal's skin through the hair follicle openings or the associated glands. Within a day or two after the entrance of the larvae a small scab forms to close the opening they have left. Once under the skin's surface the larvae penetrate the skin corium and reach the underlying connective tissue of the flesh. From this period until the grub appears in the region of the animal's backbone but little is known definitely. While in the animal body the larvae undergo a number of molts, during which time they travel, by an undetermined route, through the entire body, appearing to select loose connective tissue for their path.

After two previous molts the larvae have developed into the third stage and have reached the flesh immediately underlying the animal's skin, usually near its backbone. Since they have to spend considerable time at this spot they proceed to provide quarters in keeping with their needs. They first burrow out a considerable space in the hide's "flesh"; the bulk of the grub's body remains in this flesh space until its escape from the animal through the skin. They next arrange breathing communication with the outside atmosphere by burrowing through the corium and epidermis; the opening thus formed is known as the breathing pore.

While living in the space described above the larvae undergo two further molts, developing into their fifth and final stage and ultimately escape through the breathing pores. Should the animal be slaughtered before their escape (or very soon afterward) the hide shows "open grubs." If escape has preceded slaughter sufficiently long the hide will show "healed grubs." It is evident that the severity of healed grub damage to skin varies with the length of time elapsing between the grub's escape and the slaughter of the animal.

The grub digests and destroys the skin around it, and deposits, in the cavity described above, waste products of its own metabolism. This waste debris, or part of it, often remains in the skin after the grub's escape, being walled off and more or less permanently enclosed by the scar tissue formed. The points at which skin has been weakened by the digestive action of grubs may become infected by bacteria, and in such cases abscesses may result.

The booklet contains also 12 full-page plates showing the damage to hides done during various stages of the warbles growth, with a full explanation of each, comprising altogether 20 half-tone illustrations.

Transmission of Pullorum Disease Among Sexually Mature Fowls[2]

The widespread distribution, increase and spread of pullorum disease (B. W. D.) makes it one of the most important diseases of domestic fowl. The transmission of the disease among sexually mature birds was first investigated in 1912, and the conclusion was reached that cohabitation is a factor in the spread and transmission of the disease from infected to non-infected mature fowls.

Later, the opinion was held that the male bird might act as a passive transmitter of the disease by coitus. Brunett, in 1928, placed 17 hens that were negative to the

[1] O'Flaherty, Fred, and George D. McLaughlin; Some Histological Studies of the Effects of Grubs Upon Animal Skin; *The Journal of the American Leather Chemists Association;* Vol. XXV, No. 7, July 1930.

[2] Kernkamp, H. C. H.; The Transmission of Pullorum Diseases Among Sexually Mature Fowls; Paper No. 942, Journal Series of the Minnesota Agricultural Experiment Station; University Farm, Minn.

agglutination test for pullorum disease in a pen with 22 hens which were positive to the same test. These hens were kept together for seven months and during the period none of the non-reacting hens showed any evidence of the infection as indicated by the agglutination test. Three non-reacting males were then placed with the hens and four months later two of the non-reacting hens showed positive reactions. In another four months, three more of the original non-reacting hens gave positive reactions. At the end of 20 months, eight of the non-reacting hens that were still alive were autopsied and lesions of pullorum infection found in four.

It was assumed that the infection had not been transmitted to non-reactors until the male birds were introduced into the pen.

In another experiment, 50 naturally infected birds were housed and penned with 30 healthy birds for a period of one year. The agglutination test was made at monthly intervals. At no time did the healthy fowl show evidence serologically of infection. The author conducted two experiments, the first with 58 birds, 29 reacting hens and 24 non-reacting hens, 3 non-reacting roosters and 2 suspicious cases. Of the 24 hens with negative agglutination records, 13 remained negative throughout the experiment, a period of 13 months, and on autopsy 11 of these showed no gross changes or any pathogenic organisms when examined postmortem. Two showed gross lesions of the ovary characteristic of pullorum infection, but no organisms were isolated from them. A positive agglutination reaction occurred at one or more of the monthly test periods on the remaining 11 negative hens.

It was notable that of the 29 reacting birds at the start, 21 showed gross lesions of pullorum disease on postmortem examination either at the time of death during the experiment, or at its close after 13 months.

The findings in the second experiment differ but little from the first. A considerable period (five to nine months) elapsed before the negative hens began to give positive reactions as a result of association with infected birds. The combined experiment showed that 24% of the non-reacting birds that were kept in close contact with reacting birds ultimately became positive reactors and the *Salmonella pullorum* was isolated from the carcasses on autopsy; and 46% gave a positive reaction to the agglutination test.

Persistence of the Bang Organism After Parturition[3]

Successful control of infectious disease depends to a large measure on knowledge as to how the disease is distributed. Definite information concerning the channels of elimination of the virus of the disease constitutes a very important key in the eradication of the infection.

Successful control of Bang's disease is dependent to a large degree upon definite knowledge as to how the organism reaches the body of the infected individual. Schroeder and Cotton, in 1912, showed that some animals eliminated the organism in the milk during the entire life-time of the individual.

There is little published data on the elimination of the organism from the vagina and such work as had heretofore been done supports the belief that the organisms are eliminated for but a short period following abortion or normal parturition of an infected cow. The authors made a study of this problem on 22 aborting cows obtained from the South St. Paul Stock Yards. The results of the study indicated that *Br. abortus* is not eliminated from the uterus of an aborting cow for a long time. Three to four weeks seems to be ample time to allow the organism to disappear from the discharges emanating from the vagina. It is undoubtedly present for a longer time in the uterus, but it is not believed that this constitutes a serious danger in the spread of the virus.

The organisms eliminated after three or four weeks following parturition or abortion are apparently not viable and are eliminated

[3] Fitch, C. P., A. L. Delez and W. L. Boyd; Duration of the Elimination of Bacterium Abortus Bang in the Vaginal and Uterine Discharges of Infected Cattle; Journal Series 917, Minnesota Experiment Station; University Farm, Minn.

in such small numbers that their presence cannot be detected by culture or animal inoculation.

Live Stock Disease Conditions in Nevada

Two troublesome problems have arisen during the past year to confront the Board of Stock Commissioners of Nevada[4]—discovery of widespread infestation or sarcoptic scabies in cattle, and of dourine infection in horses over a large area. Their elimination will strain all the resources of the Board to the limit.

It is believed that the present outbreak of dourine has existed in the state for some years, but the disease was thought by farmers and ranchers to be swamp fever, and was not reported. The infected area includes a considerable number of wild horses that must be hunted down and killed before the disease is eradicated. These animals offer the most serious obstacle to the eradication of the disease.

The situation with regard to sarcoptic scabies in cattle is regarded as a serious one. So far the active cases found have been limited to bulls.

Anaplasmosis of Cattle

During the past two years several additional cases of anaplasmosis were recognized; all of these occurred in Elko county. Anaplasmosis is an infectious disease of cattle characterized by thin watery blood, weakness and great loss of flesh. Owing to the fact that the disease ordinarily occurs at the time of the year when cattle are on the outside ranges, and also, owing to the fact that the percentage of deaths is not ordinarily high, it may be that many cases of this disease are not recognized. Possibly losses from the disease through loss of flesh on animals that do not die is greater than is realized.

Cattle that are in a weakened condition when they should be well nourished and strong should be regarded with suspicion and reported to the Board. It is known that the disease can be spread by dehorning or other surgical instruments that are not properly cleaned and disinfected after each operation. Recent research has also revealed that the disease may be spread by ticks and possibly by biting flies.

Rabies

In the rabies control work, 30 state and federal hunters were employed and a total of 3,018 predatory animals were destroyed during 1929, and 3,211 during 1930. Ten cases of rabies were found.

Preparturient Anemia of Sheep

This name is applied to a disease or condition (which is literally starvation) affecting ewes in the later stages of pregnancy, especially those carrying twins, and is solely due to a deficient diet or inability to properly masticate the feed given them. It is commonly found among ewes bred for early, shed lambing.

Joint-ill and Pyemia in Sheep

These diseases are both due to infections which occur during the first few hours after birth and some years are rather common where shed lambing is carried on. They are characterized by stiffness, lameness, emaciation, swelling of one or more joints of the legs, gathering of pus in affected joints, and abscesses in the internal organs. The most severely affected die while the less severely affected may recover. While insanitary corrals are the chief source of these infections, they are not the sole source, as several herds lambed on the open range were found to have from a few to 5% of lambs affected with joint-ill or pyemia.

Caseous Lymphadenitis

This disease in an acute form appeared in a herd of some 2,200 ewes three to four days after they had been put in a corral for the purpose of lambing. The acute form of this common disease is rather unusual in this state, the above outbreak being the first one coming under our observation. The disease is caused by the Preisz-Nocard bacillus, which exists in the soil on the ranges everywhere, and especially so on sheep trails and in old corrals. This disease in a chronic form is common among sheep of all western states, but is not regarded as very fatal and is seldom recognized until the animal is killed for food. Available meat inspec-

[4] State of Nevada, Biennial Report of the State Board Stock Commissioners 1929-1930; State Printing Office, Carson City, Nevada.

tion records of the U. S. Bureau of Animal Industry show that about nine and one-half carcasses in each 100,000 inspected are condemned as unfit for food from this cause.

The above mentioned outbreak of acute caseous lymphadenitis occurred in a corral that had been in use for many years. The sheep commenced to die within three or four days after they entered the corral; from 10 to 20 dying daily until lambing was finished and the herd turned out on the range. There the losses from this cause stopped within a week, although some 300 had died from this disease while in the lambing corrals.

The ewes had commenced lambing soon after entering the corral and there was no other corral available on this ranch.

Habronemiasis

The literature on the subject contains no report of the successful treatment of habronemiasis in the horse, although records of clinical tests made with oil of chenopodium, carbon tetrachloride and some other parasiticides show that these agents are ineffective against habronema in the stomach of the horse.

The efficacy of carbon disulphide against the bot larvae in the horses' stomach led the authors[5] to try this agent against habronema.

Since the *Habronema muscae, H. microstoma* and *H. megastoma* are small parasites and likely, if killed, to be digested in the intestinal tract, the plan of destroying the animals, two to three hours after administering the anthelmintic, and examining the stomach contents was adopted.

Four animals were used in the experiments. In two, the stomachs were first washed with ten quarts of sodium bicarbonate solution. The other two were dosed without the preliminary stomach lavage. Several hundred dead *H. muscae* were found in the stomachs of the two animals given a preliminary lavage and only one-half dozen live worms were found in one animal. The treatment was more than 99% effective.

In one of the animals not given the preliminary stomach lavage, the treatment was effective in that it killed more than 98% of the worms present, but in the other animal only 68% of the parasites were dead.

It is concluded from this that sodium bicarbonate lavage is useful in that it removes a part of the mucous from the stomach and thus exposes the parasites to more direct action of the anthelmintic, and its use is advocated as a routine measure.

A small tumor in the stomach of one of the animals treated contained more than 300 *H. megastoma* all of which were alive at the time of the examination and apparently uninjured.

While no specimens of *H. microstoma* were present in the test animals, other tests indicated that this species is more resistant than *H. muscae.*

The authors conclude: "Carbon disulphide is without doubt an effective anthelmintic for the destruction of *Habronema muscae,* and the efficacy of the drug is apparently enhanced by a preliminary washing of the stomach with an alkaline solution."

The dosage employed was the same as that used for the treatment of estrus larvae, six drams for a 1,000-pound horse.

Prepared Roughages

Tests made at the University of Wisconsin[6] indicate that the various processes for preparing roughages such as grinding, chopping or streaming and "pre-digesting" had their greatest advantage in making the stock eat the coarser parts of the roughage that they would ordinarily refuse.

In this way, soy bean hay for dairy cows was improved by nearly 20% by chopping, while alfalfa was not improved for either beef cows, dairy cows or suckling calves.

It is believed that when soybean hay is selling at $20.00 per ton, or more, that chopping it would be economical. On the other hand, if the price were only $10.00 per ton, the improvement in its feeding value

[5] Wright, Willard H., John Bozievich and Paul C. Underwood, Zoological Division, U. S. B. A. I.; Critical Experiments with Carbon Disulphide in the Treatment of Habronemiasis; *Journal of the Royal Army Veterinary Corps,* Vol. 11, No. 2, Feb. 1931.

[6] Bohstedt, G., B. H. Roche, I. W. Rupel, J. G. Fuller, and F. W. Duffee; Chopping Hay for Livestock and Steaming or Pre-Digesting Feeds; Agricultural Experiment Station of the University of Wisconsin, Madison; Research Bulletin 102, December 1930.

would not justify the cost to put it through a roughage mill.

Chopping timothy hay for horses saved less than 10% and was not worth the cost. There was no advantage in grinding hay over chopping it.

Processing the feeds, steaming and "predigesting" proved uneconomical and offered no advantages over chopping. There was no evidence that any of the fibrous parts of the feed were broken down by the processing, so the heat and moisture treatment, the addition of enzymes and the labor of processing proved wasted.

Enteritidis Responsible for Lesions in Rinderpest

During the outbreak of rinderpest in Sao Paulo, Brazil, in 1921, Monteiro and Arantes isolated, from the organs of cattle that had died of the epizootic, various bacteria, the pathogenesis of which they studied in laboratory animals and in goats, sheep and cattle. The pathogenic action observed was characteristic, and it was demonstrated that many of the lesions observed in cattle attacked by rinderpest resulted from the effects of the associated bacteria.

In 1923, two years after the organism was isolated, the authors inoculated a bovine with sample B, and reproduced in that animal the same lesions that were seen during the bovine plague.

C. Neiva,[7] in 1930, nine years after they had been isolated, tried to determine whether these samples still possessed the same action, verified in the beginning. The investigation confirmed nearly everything that had been observed previously, with reference to the pathogenesis of the bacteria studied.

They still preserved their action in laboratory animals and in goats, but the inoculation of diversified doses of toxin in guinea pigs was not fatal. The infection experiments in cattle also showed irregular results which led to the belief that there had been a loss of virulence in the samples, preserved by means of translation, for a period of years, in artificial media.

The bacteriological study of the samples, in accordance with the North American school, led the author to identify seven samples as *Salmonella enteritidis;* three others as belonging to the genus Aerobecter, and the remainder (10 samples) as affiliated with the genus Escherichia.

The author concludes that the lesions in cattle observed during the outbreak of rinderpest are, in large part, due to the associated action of *S. enteritidis,* which plays the part of a secondary invader in animals weakened by the pest virus.

Calfhood Vaccination Against Bang's Disease

In the more than 30 years that have elapsed since Bang announced his discovery of the etiological factor in Bang's disease, an immense amount of research has been carried out to improve methods of abortion prevention, control and treatment, but little of this research has been devoted to a study of what might be done with the calf to increase its resistance to the organism causing the disease.

Buck [12] undertook an experiment to determine whether vaccination of the calf with living organisms at a time in its life when its resistance to the disease is known to be greatest, to determine whether a demonstrable and lasting degree of immunity could be engendered; and also in view of the known fact that calves readily free themselves of naturally acquired infection, to determine if they would likewise free themselves of living organisms used in the vaccine.

The experiment was a laborious and an expensive one and was continued for a number of years. Three types of living organism vaccine were used. One, what might be called a somewhat attenuated organism, a sort of weak vaccine; (2) a medium vaccine; and (3) a vaccine of most virulent organisms that could be obtained.

An enormous single dose of vaccine was given to calves, aged four to eight months. After the animals were bred, they, with con-

[7] Neiva, Cicero; Sobre a Associacao Bacteriana Na Peste Bovina; Archivos do Instituto Biologico, DeDefesa Agricola E. Animal, Sao Paulo, Brazil; Separado do Volume 4.

[12] Buck, J. M.; Studies of Vaccination During Calfhood to Prevent Bovine Infectious Abortion; Reprinted from Journal of Agricultural Research; Vol. 41, No. 9, November 1, 1930.

trols, were drenched with large quantities of organisms washed from recently aborted fetal membranes. The experiment was carried over two calving periods.

All three vaccines prevented the loss of calves from Bang's disease. The weaker vaccine, however, failed to prevent one of the animals from apparently acquiring the infection from the artificial inoculation during pregnancy, and perhaps carrying the organism for a time; as one of the five animals in which this vaccine was used reacted to the agglutination test for a short period.

The strong vaccine appeared to make one of the animals on which it was used a carrier of the organism for a time at least, because for a period it reacted to the agglutination test.

There was no evidence of infection of the mature animals as a result of the medium vaccine, or of the heavy inoculation given them during both of the periods of pregnancy.

Two of five control animals delivered healthy calves and three aborted during the first experiment. In the second experiment, five new control animals were used and again two delivered healthy calves and three aborted, or delivered dead calves.

On the whole, the result of the experiment cannot be considered as other than highly encouraging.

Parasitic Diseases of Horses

Schwartz, Innes and Wright [13] state that the prevention of parasites in horses by the application of sanitary measures, is the business of the horse owner. The diagnosis and treatment of parasitic diseases are functions of the veterinarian. Because treatment involves the diagnosis and a intimate knowledge of how a drug acts and when to use it or not to use it, it is advisable that all treatments for horse parasites be administered by a veterinarian.

The bulletin is an attempt to serve the horse owner, by discussing the sanitary methods for the prevention of parasitic infestation, and the veterinarian by suggesting the treatments for the various parasites; a rather large contract to fulfill in a 54-page bulletin, and as would be expected, some matters of importance are discussed less fully than one would like to see them.

In the matter of treatment, that portion of the bulletin that will interest veterinarians most, the discussion is largely a compilation of previous publications. The treatments recommended, however, it is stated, are for the most part those which have been found by experimentation to be the most effective for the parasites involved. Of course, no effective treatment is known for many internal parasites, but the following will be of interest.

Liver Flukes.—The only fluke likely to be encountered in horses in this country is the common liver fluke of cattle and sheep, which is occasionally found in the horse. There is no established treatment. However, carbon tetrachloride in small doses has a specific action on the mature flukes in sheep and calves. It may be given with safety to adult horses in doses of 6 to 12 drams, and should be effective for the destruction of the mature flukes.

Tape Worms.—Very little is known regarding treatment for tapeworms in the horse. No treatments have had critical tests to determine their precise value. Oil of turpentine, areca nut, kamala and oleoresin of male fern have been recommended. Whether or not they are effective has not been established.

Stomach Worms.—Carbon disulphide or carbon tetrachloride in capsules or by the stomach tube, may be used for the removal of stomach worms although these drugs will probably remove only those worms that are free in the stomach contents. The worms in the mucous lining and in the tumors in the wall of the stomach will probably be inaccessible to the drugs now in use.

Carbon disulphide may be given in doses of six fluid drams for a 1,000-pound animal. Carbon tetrachloride may be given in doses of six to 12 fluid drams for a 1,000-pound animal. In both cases, the animals should be fasted 24 hours before treatment.

The contamination of summer sores (Jack

[13] Schwartz, Benjamin, Marion Imes and Willard H. Wright; Parasites and Parasitic Diseases of Horses; U. S. Department of Agriculture; Circular No. 148; November, 1930.

sores) with the larvae of the large stomach worms is mentioned, but no investigation of the summer sores has been made in the United States and the authors show considerable confusion as to what causes them and as to methods of their treatment. For example, they state that the addition of quinine to an application for summer sores will prevent the animal from biting, when as a matter of fact, a mixture of rattle snakes and barbed wire would not prevent this, to say nothing of a milder application.

Large Intestinal Round Worms (*Ascarids*).—Carbon disulphide is an effective remedy for the removal of ascarids from the horse. Fast the animal 18 hours and give it a dosage of six fluid drams for a 1,000-pound animal. The worms pass for several days following the treatment. Purgatives should not be given with this treatment. Fats and oils are to be particularly avoided as they promote absorption and increase the toxicity of carbon disulphide.

Investigations indicated that carbon tetrachloride is also very effective for the removal of ascarids. The animals should be fasted for 18 hours and 6 to 12 fluid drams of the medicament administered. Purgatives are not needed with carbon tetrachloride, but it is usually advisable to give a dose of salts (?).

Strongyloides.—Nothing is known concerning effective treatment for these thread worms. In severe cases of diarrhea in foals caused by infestation with this parasite, carbon tetrachloride is worthy of a trial. Dose at the rate of one dram per 100 pounds of body weight.

Palisade Worms (*Large Strongyles*).—It is advisable to fast the animal for 36 hours before treating. Oil of chenopodium in a dose of 4 to 5 drams per 1,000-pound animal is effective. It should be preceded immediately by a quart of linseed oil or an aloes ball. Carbon tetrachloride is also of value in the removal of the large strongyles and should be used in treating pregnant mares as oil of chenopodium is dangerous to such animals. Given in a dose of 6 to 12 fluid drams per 1,000 pound animal, and repeated in four to six weeks.

Bots.—Carbon disulphide is the most effective treatment for the removal of bots. Carbon tetrachloride is much less effective. Carbon disulphide should be used in the manner prescribed for the treatment of large intestinal roundworms. Treatment should be administered from December to March depending upon the latitude.

External parasites of the horse are also discussed, the treatment being the various dips and hand applications all familiar to veterinarians.

Mountain-Laurel Poisoning

Mountain-laurel, *Kalmia latifolia* and sheep-laurel, *Kalmia angustifolia* are widely distributed over the eastern section of the United States, occurring in profusion in rough, rocky areas of the Alleghany Mountain System clear to the top of mountains.

Since the country was first settled, these plants have been known to be poisonous and have been responsible for the loss of cattle and sheep. An investigation undertaken by Marsh and Clawson [14] has shown that these plants are responsible for the loss of cattle and sheep and that they are equally poisonous to goats. They reached the conclusion, however, the wild deer are probably never poisoned by these plants and that harm to horses is unlikely. Fowl are not poisoned by eating the berries.

It was shown that linseed oil is an effective treatment for laurel poisoning. Given to sheep in a dosage of four ounces every two or three hours, it prevented the death of animals that had been experimentally fed amounts of the leaves that were fatal to non-treated sheep.

It is believed that any oil or grease constitutes an effective antidote. Lard and butter have long been recommended for the treatment of laurel poisoning. Nothing is said of the use of alcohol as an antidote for laurel poisoning although this treatment is popular with some veterinary practitioners in sections where that type of poisoning occurs.

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[14] Marsh, C. Dwight, and A. B. Clawson; Mountain-Laurel (Kalmia Latifolia) and Sheep Laurel (Kalmia Angustifolia) as Stock-Poisoning Plants; U. S. Department of Agriculture; Technical Bulletin No. 219; December, 1930.

Parasites of Fur Bearers[17]

Among the parasite diseases of foxes and skunks, ascariasis, ancylostomiasis, verminous pneumonia and cystitis, caused by *Capillaria plica,* play an important rôle. Especially the young animals are apt to become infested with ascarids—*Toxacara canis* in foxes and *Ascaris columnaris* in skunk—because they are liable to become infested prenatally. The worm eggs are easily demonstrated with the aid of the Hamburgian coverglass method. Only infested animals should be treated. One should beware of applying the same vermifuges that are used in canine practice. Manure is to be removed daily. The common disinfectants leave the ascarid eggs unharmed.

Ancylostomum caninum (hookworm) is often encountered in older foxes and is the cause of intestinal disorders, anemia and stunted growth. It should be combated either with Sprehn's capsules or with carbon tetrachloride given together with paraffin-oil in gelatin-capsules; for the hydrocarbon alone has toxic properties. The foxes should not be allowed to bite the capsules, since the inhaled carbon tetrachloride will kill instantaneously. The simultaneous application of a hydrocarbon and castor oil is likewise fraught with danger. The runs are to be sprinkled with 3% solution of chloramine. Grass is to be kept short because the worm larvae usually crawl up on the moist stems.

The dreaded verminous pneumonia in breeding foxes is caused by heavy invasions of *Crenosoma vulpis* and *Eucoleus aerophilus* (lungworms). Both parasites live in the bronchi and bronchioles, *Eucoleus* is found also in the upper respiratory passages. Vajda's method is used for the detection of the larvae of *Crenosoma vulpis* in the feces, while the Hamburgian method is used for the detection of the lemon-shaped eggs of *Eucoleus aerophilus.* The eggs of *E. aerophilus* may easily be mistaken for those of *Trichuris vulpis.* The latter parasite, however, has never been observed, neither in Germany nor in Czechoslovakia.

[17] Ullrich, K. The more important diseases of fur bearing animals. *Zverolekarske rozprava* 1930 No. 22:262 and No. 23:265. Abstr. *Prag. Arch. f. Tiermed.* pt B vol. 11:52.

The autopsy of foxes, dead from verminous pneumonia reveals a fibrinous pleuritis and verminous areas in the lung tissue. The peculiar eggs of *Eucoleus aerophilus* and the motile larvae of *Crenosoma vulpis* may be seen in the bronchial mucus.

No successful treatment of verminous pneumonia is known. The diseased animals are to be segregated and to be used to best advantage. As a prophylactic measure, it is recommended to keep these foxes in cages with wire bottom to prevent reinfection from the feces.

Capillariasis Vesico-urethralis. *Capillaria plica* is a parasite of foxes living in the mucosa of the urinary bladder. This nematode causes a catarrhal and frequently a pseudo-membranous cystitis. The disease reveals itself especially when the foxes have an opportunity to micturate into the drinking vessels which are fixed in a low position. The diagnosis is made at autopsy through microscopical examination of the mucosa of the bladder.

Medicinal treatment capillariasis vesico-urethralis is out of the question. The preponderance of effort is to be directed to prevention.

Hymenolepis octocoronata has been found as the cause of a disease characterized by enteritis and emaciation. The feeding of biscuits containing a calculated amount of arecolin proved to be effective. Intestinal diseases in mink are also caused by certain species of *Strongyloides* and *Trichostrongylus.* A certain *Trichuris* species belongs to the harmless intestinal parasites.

A species of *Capillaria,* not yet accurately determined and Coccidia have been found to cause severe enteritis.

Coccidiosis in foxes due to *Isospora bigemina,* is accompanied by diarrhea. Fecal examination by the Hamburgian method will confirm the diagnosis. Healthy appearing foxes may be carriers of oocysts. Diosis, Igitol and Sprehn's capsules are recommended as treatment. Cages and runs are to be disinfected thoroughly with creolin solution. The soil should be plowed.

For the cure of enteritis due to cold, frequently encountered in mink during the spring and fall of the year, the use of Hey-

den's adsorgan is recommended as a remedy. The pneumonias of short duration are also due to cold in these animals.

Of the trematodes deserving attention as the causes of severe enteritis in mink, *Eurihelmis squamula* must be mentioned. The frog is the intermediate host and should therefore not be used for food purposes. *Euparyphium melis* is another frequent parasite of mink and causes likewise enteritis. *Distomum acutum* causes a severe inflammation of the nasal cavity and the maxillary sinus in mink and fitches. Later the osseous tissue of the bones of the head disappears and is replaced by tissue, rich in capillaries. *Paragonimus kelicotti,* another trematode, has been described as the cause of a pneumonia.

Distomatosis of the liver, for the first time diagnosed in nutria by Doctor Sprehn and by the author, needs further investigation. There are many unsolved questions concerning the treatment of the latter disease.

COMMON BACTERIAL DISEASES

The more common bacterial diseases of fur animals are tuberculosis and paratyphus-infection. So far, only the bovine type of the tubercle bacillus has been demonstrated in these animals. The infection is easily explained by the feeding of slaughterhouse offal and milk. All animals found reacting to the tuberculin test are to be segregated and to be excluded from breeding.

Meat poisoning, due to paratyphus-infection, is very fatal and is of frequent occurrence in young foxes, mink, fitch and ferret. In foxes, vaccination with paratyphus-serum would have to be considered.

Distemper has been described, in the fox, mink and raccoon. The author observed a case of nervous distemper in a young fox. The diagnosis was confirmed histologically.

COMMON NON-INFECTIOUS DISEASES

Other diseases worth mentioning are: acute dilatation of the stomach, ricketts and various forms of nephritis and cystitis. Attention is to be called to the fact that the mixture of cod liver oil and phosphorous for the treatment of ricketts has a fatal effect upon the fox. Either cod liver oil alone or, still better, vigantol (activated ergosterin) should be given.—Dr. N. Weidlich. Trans. by Dr. Fritz Volkmar.

NOTE—The Hamburgian method of fecal examination consists of placing two grams of the feces to be examined in a petri dish of 5cm diameter and adding 2cc of saturated salt solution and mixing thoroughly. Three cover glasses are immediately laid on the surface of the diluted feces. Ten minutes later the cover glasses are transferred (with forceps) to microscope slides and examined in the usual way.

FAVORS EASIER REQUIREMENTS FOR LICENSE TO PRACTICE

After reading Dr. Rembrandt Morgan's article in VETERINARY MEDICINE for June 1931, on the subject of Reciprocity in Licenses, I want to say that I believe when a man holds a diploma granted him by a recognized veterinary college and presents this diploma to a state board of examiners, he should be granted a license.

Our Veterinary Practice laws in most of the states permit the licensing board at its discretion to do this. It would be beneficial if examining boards would follow this practice in that by making it easier for graduates to obtain licenses to practice in different states, it would favor a better distribution of veterinarians and furnish a good service to communities that must now depend on bootleg veterinary service by county agents and proprietary medicine peddlers.

I would like to read more discussions on this subject written by those better qualified than myself. Licensing boards would be serving well the livestock industry of their states by doing everything in their power to facilitate the licensing of qualified men, and I insist that the possession of a diploma from an approved veterinary college is far better evidence of qualification than any single examination can possibly be.

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